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Original Contributions.

REPLY TO EDITORIAL COMMENT.

By G. V. Black, M.D., D.D.S., Sc.D.

In the February, 1897, issue of The Dental Digest appears an editorial comment upon a paper which I presented to the clinic of the Chicago Dental Society on the first of the same month. The paper also appears in full in the same issue. Some points in this editorial seem to me to merit attention.

First, I may say that the kindly tone of the criticisms made is fully appreciated, and I thoroughly believe in the importance of a full consideration of the points that were presented and which is also voiced in the comment to which I refer.

The especial point to which objection is made is thus stated—nearly correctly: "He advises cutting away the entire proximal surface of tooth substance clear to the free margin of the gum; the buccal and lingual surfaces (walls of cavities) also are to be cut away sufficiently to place the line of margin so it will be constantly cleansed by the food in process of mastication, and the parts thus removed are to be restored with cohesive gold, contouring sufficiently to protect the interproximate space, and so shaping that the excursions of food will keep the surface clean."

This I should amend by the use of the words *margins of the filling* in place of the word *surface* in the last line, recognizing that to keep the whole surface clean is impracticable by any method now within our power.

The editor then adds: "This method, when properly carried out, will prevent recurrence of decay in proximal surfaces more surely than any other," and in the same sentence hastens to object to the use of this more sure method in these words, "but think what it

means in the majority of cases to adopt such extreme measures, both from the standpoint of the patient and operator," and states that "The preparation of cavities, filling and finishing of filling, when conscientiously performed, must consume from four to six hours of time, independent of that taken in securing the necessary space, besides requiring an amount of skill and good judgment not possessed by the majority of operators."

I wish to say in advance that I fully recognize that the dentist must often operate under conditions which limit his effectiveness, or conditions which cause him to plan a different operation from the one which would be regarded as desirable and best under favorable conditions. But while this is true, we are not justified in the statement that the plan which is the best, or in which recurrence of decay is least likely to occur, is to be reserved for *extreme cases*, and that a more rational course would be to adopt as the general rule something supposed to be easier, that is, "after removing the decayed portions, to remove only so much of the tooth substance as would allow us to anchor the filling properly." The plans of operating which furnish the greatest safeguard against recurrence of decay are the best, and, being the best, our patients have a right to them, and have a right to the assurance that these plans are the rule of our practice, and that they be not departed from except for good and sufficient reasons particularly applicable to the case in hand.

The objection as to the time required to make fillings in the manner indicated seems to me to be very much overstated—that is, from four to six hours. For many years it has been a rule of practice with me to limit sittings of patients to two hours when possible, and not to allow more than three hours in the most extreme cases; yet I have had no difficulty in gaining space, preparing cavities, filling, and finishing fillings within that time on the plans indicated, except in a few extreme cases. In some of these certain portions of cavity preparation has been done at a previous sitting, or the finishing deferred to a subsequent sitting. With children, and sometimes with adults who from any cause are unable to endure long sittings well, the operation is thus divided in order that they may have short sittings.

The improvements in the detail of cavity preparation and of finishing lightens and shortens this part of the labor very materially.

Bold cutting upon definite lines is something quite different from *feeling one's way* to possible sound margins, and is done in much less time and with less worry of the patient. The better shape of cavity facilitates rapid packing of gold, and the abandonment of file-cut finishing instruments for thread saws and cutting instruments makes trimming to shape comparatively easy and rapid. These are, of course, matters of detail that cannot now be discussed *in extenso*.

As to the price to patients, it is the old adage, "The best is the cheapest," intensified. The dentist may let his patient off this year with a less fee, only to double it later with the expense and worry of additional sittings. A limitation of fee will not pay a patient for a refilling.

The necessary limitations constantly met with, due to adverse conditions, which divert operations from the lines justly deemed best, are so many and so varied as to scarcely admit of discussion. We must have due regard for the disabilities of our patients, either young or old, and yet wise planning for their good will materially modify or set aside many of the seeming limitations that confront us.

When we can arrive at a safe basis for estimating the coming of immunity from caries in our patients, a thing we are now constantly noting as coming with advancing age, we may justly modify the width of cutting, or extension for prevention. Possibly even now some may be able to see in adults and middle-aged people the signs of coming immunity so clearly marked as to justify less vigorous extension. But the relapses are so frequent, and we have as yet so little accurate knowledge of the conditions governing such changes, that it seems to me impracticable to base plans of procedure upon any physical signs now apparent. If the editor of the DIGEST has reliable data upon this point he should give the profession the benefit of it without delay.

Touching the work of Dr. J. Leon Williams referred to, it is possible that my appreciation of its importance is somewhat keener than that of some others, for the reason that I struggled along that line of research in the past and had arrived at a point from which I could pretty clearly see the line of facts without being able to prove them. Dr. Williams has been more successful and I am much gratified. It may require years for the profession to fully appreciate its importance, as was the case with Miller's work, and is usually the case

with any marked advance in dental science. Generally dentists fail for a time to see its relation to operative procedures. But this last advance, bearing directly upon the nature and conditions of the beginnings of caries in the enamel, is much more directly related to the means of prevention of the inception of caries and of the recurrence of caries after filling than any direct discovery of recent years. It gives us the conditions of the beginnings, or of the initiation of recurrence of caries in a nut-shell, and with it the key to prevention of recurrence after filling. Caries has its beginning under films of agglutinated microorganisms, clinging to the enamel or in pits and fissures, and nowhere else. It follows that if we can so place the lines of cavity margins that these will be continually swept away, and make a perfect filling, we will not have recurrence.

To protect the whole of the proximate surfaces does not seem possible by any method of artificial cleaning within my knowledge, though very much can be done to limit the number of decays.

LOCAL ANESTHETIC EFFECT OF EUCAIN HYDROCHLORATE.

By Theodore F. Chupein, D.D.S., Philadelphia.

This local anesthetic has given us great satisfaction in its use. We have been able to extract teeth painlessly with it, which we were never able to do with cocain. True, the frequent serious toxic effects of this latter drug ofttimes deterred us from its use; nevertheless we have on occasions used it, but always with misgivings. Eucain seems entirely free from these dangers, though injected in solutions of such strength as would be fatal with cocain. It produces thorough local anesthesia absolutely without toxic effect, so that the dentist may use it without the least misgiving. A solution of 15 per cent may be used, but a 10 per cent solution is quite sufficiently strong to obtain all the benumbing effect needed.

Eucain is furnished to the dentist as a white powder, inclosed in small vials of 1 gram (15 grains). To make a 10 per cent solution, dissolve the contents of one vial in 150 grams (2½ drachms) of sterilized water. Of this solution, which any dentist can make for himself, 5 to 10 drops are sufficient for a painless extraction; but one syringeful may be injected, one puncture on the inside and one on the outside of the tooth to be extracted. As many as twelve

syringefuls may be and have been injected without producing any toxic effect whatever. To avoid the pain of the puncture, a little of the solution may be rubbed on the gum with the end of the forefinger.

We have been able to produce the "blanching" of the gum, as well as the "welt" or elevation on this tissue—the necessary sign of local anesthesia—with eucain, which we were never able to do with any of the solutions of cocain which have been suggested. It is our experience that unless the blanching as well as the welt are produced when the solution is injected, insensibility will *not* be obtained. The needle should be inserted as close to the alveolus as possible, and the forefinger of the left hand pressed on the gum as near the point of the syringe as possible. When the solution flows from the syringe with only slight pressure on the piston, the anesthetic effect will not be produced; it is only when considerable pressure is used on the piston that the obtunding effect is secured. It is better to make several punctures until this resistance to the injection is secured rather than make the attempt without securing the blanching and welt, for these are the invariable signs of insensibility. We have operated immediately after the injection is made, before the subsidence of the welt, but other operators have advised waiting one minute or more before doing this. In many cases we have made but *one puncture* and this on the outside. We do not extract many teeth, but have extracted with this agent more successfully than with any other local anesthetic.

It must not be considered that eucain is an infallible anesthetic—that is, it has not been so with our manipulation. Some teeth which we have extracted, even when the blanching and welt were induced by the injection, were reported by the patient "very painful," while others, where we had considerable trouble and used considerable force, and consumed considerable time to dislodge them, were reported by the patient as giving "absolutely no pain."

After the extraction it is well to press the gum over the puncture to force out any eucain that may be in the tissue. This, however, applies more especially where several teeth have been extracted and several punctures made.

In the use of the syringe we would recommend to blow through the little nozzle after each time it is used, and to grease one of the

thus be able to do more to elevate professional character, and make the influence of the dental profession in America more potent in all its relations with the world.

The social element is one of the most powerful forces for the progress of humanity, and this will be greatly strengthened by union. Only a few men feel able to afford the time, to say nothing of the expense, necessary to attend two series of meetings in one season, both serving the same end, hence under the present dual organization many are deprived of the satisfaction and benefit of personal acquaintance. In one association the members from the East, South and West will come together at regular periods, compare experiences, offer mutual suggestions, and enlarge, deepen and strengthen their personal relations. All those who were fortunate enough to attend the union meeting of the American and Southern associations in Louisville in 1888 realize how pleasant it is to dwell together in unity.

By union the importance of the state societies will be enhanced, as the meetings of the larger body in each section of the country will be less frequent, the leading men of each state will naturally interest themselves in their home societies and make their proceedings more valuable, and thus be more able auxiliaries to the national association.

In 1894, at Old Point Comfort, the American Dental Association appointed Thomas Fillebrown, J. Y. Crawford, Louis Jack, B. Holly Smith and J. N. Crouse a committee to promote the cause of union of the two associations, and invited the Southern Dental Association to appoint a like committee for the same purpose.

In response to the invitation the Southern, at its meeting in Atlanta in 1895, chose Drs. L. G. Noel, E. P. Beadles, J. T. Calvert, F. Peabody, and J. R. Knapp a committee to consider the subject with the committee of the American. These committees have sought to obtain a consensus of opinion as to the desirability of union and the essential points of a plan which would prove acceptable to the members of the associations, which would protect the interests of the minorities, and at the same time provide the best working plan at the present time possible.

At first considerable opposition to the movement was expressed. The opposition seemed based upon the fear that rights would be denied the minority, and also upon affection for the old associations.

fine wires which are furnished with all hypodermic syringes and insert this wire into the minute tube; otherwise these tubes, being generally made of steel, would rust and thereby become useless.

Eucain hydrochlorate possesses about the same anesthetic power as cocain. It is not necessary to add any antiseptic to the eucain solution, as it does not deteriorate like cocain solutions, nevertheless we would advise that only such a quantity be made as would last one month.

The sole agents for eucain hydrochlorate in the United States are Schering & Glatz, 55 Maiden Lane, New York City.

UNION OF THE AMERICAN AND SOUTHERN DENTAL ASSOCIATIONS.

By Thomas Fillebrown, M.D., D.M.D., Boston, Mass.

The American Dental Association was formed as a more perfect organization to succeed the American Dental Convention, which it soon supplanted.

The Southern Dental Association was organized to supply a need which can now be better met by one large truly national body.

Both associations have done good work, and each has supplied a want existing in the professional life of this nation.

Both have been practically local societies, though ostensibly national. The Southern has been limited by its name and its practice. The American has continued too much an Eastern institution, and has hardly kept pace with the march of progress. Its methods no longer serve its best interests; and there need be no surprise at the loud call that is heard for a reorganization and the adoption of methods that shall infuse new life into its councils.

The vital question to-day is, how to form and organize a society which shall be truly national, and serve the needs of the dental profession of this country.

The most natural course seems to be a union of the American and Southern Dental Associations in one strong, national society, with a constitution which protects all interests, invites the best efforts of all its members, and provides for progress and enlargement in the future.

The profession united in one national association will respect itself more than it can while divided, will be more influential at home, and

to some time in September, so that members would come fresh from their vacations ready for work instead of being tired out at the end of an exhausting year. The change would also avoid the excessive heat of August.

While the College Faculties' Association and the National Board of Dental Examiners have done a great work for the uplifting of the profession, they have thus far worked a direct injury to the interests of the national association.

The Southern has suffered because so many of the members have necessarily neglected its meetings to attend the meetings of the Faculties and Board of Examiners, which have been held at the same time and place as the meetings of the American. The American has suffered severely by the meetings of the Faculties and Board of Examiners overlapping its meetings and absorbing the attention of otherwise active members.

This can be remedied in one of two ways, either by the Faculties and Examiners meeting at another time than that of the national association, or by meeting a week earlier at the same place as the national association. The latter plan is very likely to be tried the present year and its effects can then be properly estimated. It is very reasonable to expect the meeting of the Faculties' Association to be called as early as the Friday before the time of the meeting of the American and the Southern associations at Old Point Comfort.

If the Board of Examiners shall also meet early the work of these bodies will be completed and the members be left free to engage in the work of the national association.

This is certainly one of the most important considerations for the interests of all concerned.

Dr. W. C. Barrett, at the last meeting of the American Association, and Dr. A. H. Thompson, in an article in the late issue of the *Dental Practitioner and Advertiser*, and several other interested members, have expressed the conviction that division associations should be formed to meet annually as parts of the national society. It is undoubtedly a wise and desirable thing to do, and it seems now quite possible to carry out this idea by providing for it somewhat as follows:

1. The members of each division South, East and West may form one or more branches to meet annually except the year the national association meets in the same division.

As the matter has become better understood opinion has been more favorable to the movement. The votes of both associations, although not decisive, have invariably been favorable to a union.

A plan including the following provisions meets with quite general acceptance:

1. It seems desirable to take a new name, one distinctly national; just what it should be has not yet appeared. The committee invites suggestions from any member interested.

2. Divide the country into divisions, South, East and West, and meet alternately in each section. This will insure a meeting in each portion of the country every third year.

3. Organize the new association in sections the same as the American is now, but have the president (or executive committee) appoint chairmen known to be interested and competent to do the work. It is believed this would lead to more effective and better work. Often in the past but few would be present at the organization of the sections, and men neither fitted nor interested would be chosen to official positions.

A return to the old committee plan has sometimes been advocated. This plan has been followed in the Southern, and the results of the past few years have not been especially encouraging for its adoption in a new association.

The plan of sections above proposed contains the essentials of the committee plan, but it makes it obligatory upon every member to join one of them, and insures an efficient head to organize and lead the work.

5. A more intimate relation with the state societies may be promoted by providing that they become practically branches of the national association, and also by making it the duty of societies sending delegates to make a report of the year's work of the society to the association.

6. Provide for membership of permanent delegate and honorary members as the American Association does now.

7. Choose a president at large, or from the section in which the last annual meeting was held.

Choose one vice-president from each section; such vice-presidents to be of equal rank, and not first, second and third, as is now the case in both associations.

8. To many it seems desirable to change the date of the meeting

2. Each branch shall manage its own affairs, subject to the constitution and regulations of the parent society; elect its own officers, and pay its own incidental expenses.

3. Each branch is to receive delegates from societies within its limits, and they shall have the same standing in the national association as those joining direct from local societies.

4. The proceedings of the branches to be sent to the national association for publication in the transactions of the year.

The details of a plan to accomplish this result can be arranged which will not interfere with the customary working of the national association. This plan will prevent the abolition of the present societies, and thus remove the principal objection that has been raised against union. One branch would be practically the Southern Association, and the Eastern would include a large proportion of the American membership.

The West might reasonably form two branches, the Western branch and the Pacific branch. Eventually the best interests of the profession may be served by making four divisions of the country. At present we shall probably succeed better with three.

This article does not presume to be exhaustive but only suggestive.

The discussion of the subject will show us the best way.

The committee has no plan nor desire save to formulate the wishes of the members of the two associations, and invites suggestions as to the points mentioned, or any others which it seems desirable to have considered.

MAKING DIES FOR CROWNS.

By W. B. Fahnestock, D. D. S., Cincinnati, O.

I believe I have hit upon something that may be of value to some young man like myself, who has to find out many things by hard knocks. In making dies for crowns it is often difficult to obtain a die and counter-die of Mellotte's metal, because the surface of the cold die, especially the cusps or any small prominent part of the male die, is very liable to fuse when the melted metal for the female die is poured upon it. This happens even when the male die has been well carbonized and is kept cold by standing upon a piece of ice while the melted metal is being poured, and the latter is made only

hot enough to barely flow. Having used the utmost care in doing this I find it impossible to separate the dies when cold without breaking.

To overcome this difficulty completely I burnish a piece of tin-foil over the male die, and leaving this upon same pour the metal for the female die upon it. When cold the two dies will fall apart, and if the foil has been well adapted to the male die the female die will be sharp and as good for all practical purposes as if it had been poured directly upon the male die. The tin-foil prevents the surface of the male die from fusing, providing it be cold before the female die is poured upon it.

My observation may not be new, but I have never heard of it before, and found it out only after much difficulty with other methods in popular use.

REMOVAL OF DEPOSITS UPON TEETH.

By I. A. Freeman, D. D. S., Chicago. Read Before Chicago Dental Society, March 2, 1897.

In bringing this subject before the society it is not the intention to discuss the subject of pyorrhea alveolaris as such, but the removal of deposits which are analogous to it; neither is it intended to treat of the different kinds of calcific concretions, or the causes of these deposits found upon the teeth to a great extent. Deposits are defined as "that which is deposited, thrown, or laid down, especially matter precipitated from a solution in water or any other liquid."

Various authors give the origin of the calcific deposits found upon the teeth as being the saliva and that of the blood serum. Climatic influences govern to some extent the amount and rapidity with which this deposit is made. In a warm climate with dry atmosphere there seems to be far less accumulation than is found upon the teeth of people inhabiting marshy and damp regions and who as a result are troubled with malarial affections. Those persons who are poor eliminators of the waste products of the system are more subject to these concretions than those who are known as good eliminators. Age has its influence. For instance, when the osseous formation is completed there seems to be less demand for the lime assimilated from the different foods, and so the secretions become loaded with it. Now with poor elimination the presence of carbonic acid gas as waste in the secretions gives to them the solvent properties, so

they are loaded with lime-salts, and as a consequence in different cavities of the body are found these products: stone in the bladder, gall-stones, calcific deposits upon the teeth, etc.

Pathological conditions have a varying influence upon the amount and the rapidity of these accumulations. That which is the more rapidly deposited is, as a rule, soft and of light color; while that which is less rapidly laid down is very hard and dark in color. Where there is a rapid development of calcific concretion the sufferer will usually find it necessary to seek a dentist for relief frequently, thus removing one of the causes of the dark, hard variety, which is said to be the cause of the action of lime, the solidity or hardness and color being the result of long-standing habits, etc., which not being deposited rapidly does not irritate the gums, and so does not drive the patient to the dentist on that account.

Now there are several means suggested for the removal of these deposits. If a solvent could be found that would not be injurious to the tooth substance, and yet be sufficiently powerful to cause the softening of this formation known as salivary calculus, it would indeed be a great boon to the people. It is said that carbonic acid is a good solvent of lime. Possibly carbonized waters, as furnished for soda fountains, might be found beneficial as a wash for the mouth. Perhaps by constant use it would lessen the accumulation, but might not prove to be so helpful as some other kind of acid. Aromatic sulfuric acid is favored by some, both as a stimulant in pyorrhea pockets and also as a solvent of lime which may be left after surgical interference.

Dr. Harlan has suggested trichloracetic acid in dilute form, as being both safe and helpful as a stimulant, and also as a solvent agent, to be used after removal of the deposit by instrumentation.

At a meeting some time since Dr. Younger said he used the commercial strength of lactic acid for the purpose of dissolving the small particles of serumal calcific deposits that may have escaped the instrument. Iodin has been suggested and used as a solvent of these deposits, especially that of green stain found upon the teeth of children. Iodin in other forms has been used with electricity, the theory being that by the decomposition of iodin the electrolytic action was also had upon the lime-salts present in the nodules or scales upon the teeth. I must confess that I have had but a very limited experience with these agents, and I depend mainly upon

surgical interference in my practice, using instruments such as are found in our dental depots in great variety. And here I desire to say a word concerning the instruments provided for this purpose, comparing them with those found in the dental depots thirty years ago, for at that time the instruments were crude, heavy and totally unfit for the purpose intended. It is said that Riggs' disease, not yet known as pyorrhea alveolaris, was incurable, and I believe it was rarely ever treated, as with those instruments it was impossible to remove deposits situated below the gums without nearly murdering the patient; while to-day we are provided with beautifully constructed instruments, and it is quite possible to reach and remove the scale or nodule, though it be situated well-nigh at the apical extremity of the tooth. Furthermore, we had not at that time another agent which is so helpful and so full of relief to the patient, cocain. Surely along this line dentistry has made one of its greatest advances. The set of instruments suggested by and known as Dr. Cushing's set of scalers or cleansers, with those forms added by Dr. Harlan, as now manufactured, are the most ideal of any, although there are many forms suggested by others that are very helpful and important adjuncts to those mentioned, and I presume each dentist has some forms of instruments of his own device which he regards as indispensable in his practice and are to him the great desiderata.

We come now to consider briefly some of the preliminary steps in removing deposits upon the teeth. I think it will always be best to first take observations, that we may come to a knowledge of all the conditions—what kind of a deposit we have to deal with; whether it be that which is rapidly desposited, light in color, soft and quite easily removed; or of the dark, hard variety; for if of the former the time necessary for its removal will usually be less than if it be of the latter. Then the form of the teeth should be taken into consideration, whether large, bell-shaped crowns, or short, small and of conical form; whether irregular or well arranged in the dental arch; if in close contact; if the denture be complete; if there be considerable recession of the gum, for the extent of this lesion will have a very considerable influence on the facility with which the operation may be done. These are some of the points we shall do well to observe, for there will be scarcely any limit to the degree of thoroughness demanded in the work to be undertaken.

The operator should always first become acquainted with the case he has in hand and prepare himself for the accomplishment of the work desired. I think it best that the patient be informed with regard to the importance of the operation and the amount of labor necessary for its accomplishment, so that the operator may feel free to make such reservation of time, either for a continuous sitting or for subsequent sittings, as will result in perfect work. I think that the time and physical exertion consumed in properly cleaning a set of teeth which are affected to any considerable extent, or have any amount of deposit upon them, and the subsequent treatment of the gums and teeth, are least appreciated in importance by the dentist himself, and as a consequence by his patient, of any operations that we as dentists are called upon to perform.

I fear that we have not, as a rule, been thorough enough, or have not used anything like the time we should to accomplish the object sought, namely—the cure and eradication of the disease or trouble. Doubtless one reason why some dentists are always busy and have their time fully engaged in advance is because of their exhaustive painstaking in all operations submitted to them. The fact is, we should never be in a hurry about our work. If our patients cannot give the time necessary to complete an operation at one sitting, I believe we should arrange for and do only such a part as can be done perfectly in the time set apart for them. For instance, if you can get your patient to sit for only such time as will be required to clean one tooth in the most thorough manner, why do that and no more; then proceed with the surfaces adjacent or next to the one so completed, but do not leave the first until you have done with it. It may be urged that the hemorrhage from wounded and bleeding tissues will cover up the deposit to be removed, so that the work will be greatly hindered if confined to one locality. In reply to this I would say that the smaller the area so wounded the less will be the hemorrhage and obstruction, and then with proper preparation we can control it to a large extent.

And here we come to consider the preparations for the performance of this work. First, the patient seated in the operating chair should be carefully protected, by placing towels about the neck and lap, from having the clothes soiled. Instruments should be sterilized and so placed that they will be within easy reach, and should be of sufficient variety to reach all surfaces as readily as pos-

sible, whether regular or irregular, in close contact or well separated. These instruments should be of metal throughout; wood and ivory handles should be discarded. There should be at hand a large syringe for the purpose of washing away the dislodged particles and care should be taken that all calcific spiculæ be removed, for if left within or in contact with the soft tissues they will become a source of irritation. Rolls and pellets of absorbent cotton and folds of bibulous paper should be ready with which to absorb secretions consequent upon the disturbance of the tissues and excitation of the salivary glands.

A mouth-mirror, which has been warmed by either a bath in warm water or by dry heat, so that condensation of moisture from the breath upon it may be avoided, and two or three silver probes of different forms and sizes should be at hand, to be used as explorers of the surfaces beneath the free margin of the gums, by the delicate manipulation of which one may become an adept in the use of them, so as almost to see by them. Indeed, as in other departments of surgery, they are the eyes of the operator to discover the hidden nodules or scales, roughened surfaces and ragged alveolar borders. Now for this delicacy of touch so necessary for the detection of these minute particles of calcific deposits the fingers must be well cared for; should not be roughened by manual labor, or toughened by the handling of hot metals or the hot end of a cigaret, or otherwise made incapable of that sensitiveness necessary to reveal the most slightly roughened surface upon the teeth or the parts the probe may come in contact with, for if we expect to succeed in our endeavor to cure the case we have in hand we must discover and remove every particle of foreign substance, concretion or deposit.

But there is another instrument needed to be used in treating the parts before we can even approach in many instances the hidden offending nodule, so great is the pain caused by forcing away the gums, swollen and sensitive as we so often find them in pyorrhea cases. These tissues must be anesthetized before operating upon them, and a syringe of delicate construction to carry a mild solution of cocain, preferably 2 to 4 per cent, well down into these pockets should be at hand. Folds of bibulous paper should be placed around the parts so as to take up the excess which may escape from the pocket and thus prevent its absorption by other parts or tissues. With these preparations made we are ready to proceed, having

selected the tooth upon which to begin, which will, of course, depend upon what the conditions are and the extent to which the lesion has developed. The instruments which reach the exposed parts most readily will be required first. For instance, if working upon the lower incisors a long curved instrument, used by exerting force towards the gum margin along the lingual side, is the form of instrument usually preferred, the little finger resting upon the cutting edge of tooth, thus guarding against undue injury should the deposit be suddenly dislodged.

The mallet may here be used when the force required to dislodge the scale is so great that it is unsafe to use hand pressure alone, which sometimes happens when the dark, hard variety is to be removed. When the surface has been cleared, other very thin instruments, sharpened to an edge, may be pushed through from the labial aspect, and in this way the lateral sides may be cleaned. To supplement these a broad, thin, hatchet-shaped instrument may be used with good results from the lingual aspect. When the lingual surface needs treatment a straight, thin instrument with force exerted from the cutting edge towards the cervix is best. These instruments will be found sufficient in an uncomplicated case, but should the deposit be beneath the gum upon the labial or lingual surface it will be necessary to have other forms and more delicate instruments. These are found in the set advised by Dr. Cushing.

For the removal of deposits situated beneath the gum margin and extending to the apex, instruments that form a short right angle to the shaft will be found best adapted, and they are to be used by carrying past the nodule, then by pressure towards and upon the root and traction made towards the cutting edge, the right angle end or edge catching up and removing some portion of the deposit with each motion or traction. By repeated and persistent efforts the deposit may be removed and the rough surface smoothed. Of course other instruments will be found helpful; sometimes the scale may be removed entire by the long, thin, curved instrument suggested by Dr. Harlan, the force being exerted toward the apex.

After the various surfaces have been cleared of the large mass of calcific matter, finely pulverized pumice-stone should be applied by means of rubber cup-discs, moose-hide points, wood points, etc. Brushes are helpful and have their place. Along the root beneath the gum a piece of soft pine or white wood will carry the powder,

and by rubbing carefully will sufficiently smooth those surfaces. Frequently during and after this procedure the syringe should be used with a mixture of some antiseptic in warm water, preferably Black's 1, 2, 3, ℥i; alcohol, ℥iii; glycerine, ℥ss. Use ℥i in one glass of water and it makes a very pleasant wash for the patient to use. The syringe should be one upon which sufficient force can be applied to wash away the powder, debris, coagulated blood, etc.

This constitutes the typical procedure and will sufficiently indicate the treatment of this lesion, except where a surgical operation is indicated. Of course, there are difficulties attending the treatment of each individual tooth, for which special instruments will be needed to be able to reach all surfaces, and the ingenuity of the operator will be brought into play to overcome them, but he must be patient and persistent, especially with the molars, where each root must be treated as an individual tooth, and where the advantages of everybody's effort to produce an instrument for rendering each difficult operation as simple as possible will be duly appreciated.

Discussion. Dr. F. R. Ross: Only one thing more occurs to me—that we must remember we are working on human tissue and that it is very painful. I can speak from personal experience, for I was in the chair at a clinic once for three hours, and the onlooking dentists pulled and hauled me around as if I were insensible to pain.

Dr. G. V. Black: This is a matter of great importance, the greatest in dentistry. I see more teeth lost from this disease than from caries, and people come continually with the peridental membrane permanently injured by these deposits. The first thing to do is to remove the deposits with the instruments described. Practice handling until you know them and where to place them against the roots of teeth to remove deposits. The importance of skill in this work is not yet appreciated by the dental profession, and the same may be said of the treatment. Cases come with the peridental membrane badly destroyed and yet are dismissed after a little scraping. I have had patients present with half the membrane around the affected teeth gone, and yet they have used the teeth to chew with for ten or fifteen years afterward. The teeth did not grow worse nor did the membrane. Such patients were educated to come for treatment once in from two to six months, and it was a lifelong task, but it was possible to keep up the use of the teeth, so that the food could

be masticated with a degree of comfort. Teeth in this condition should be used as vigorously as possible, in order to keep them and preserve their health.

Dr. Garrett Newkirk: I would simply add emphasis to the sterilization of instruments. It is most important here, as a wound with these instruments is very apt to infect the soft tissues. Scalers with hooks are difficult to keep clean, but there is no means so certain for sterilization as boiling after use and leaving with some preparation, such as oil of cassia, on them.

One case occurs to me, where the lower incisors were badly loosened by pyorrhea and crowded, and one was in a hopeless condition. The worst one was removed and the others were cleaned and then drawn together by ligatures, apparently curing the case. Where the teeth were so crowded that one could be spared, and a condition of drainage established, cases have repeatedly been cured by removal of the worst one.

Dr. E. R. Carpenter: There is one point—the necessity of working on but one tooth at a time. In removing these deposits take a single tooth, select the necessary instruments, then diagnose carefully, so that you may know how to proceed after you begin the work. I cocainize the gum with a 10 per cent solution, covering the surrounding gum with cotton, and never leave a tooth until I think it is perfectly clean.

Dr. E. Mawhinney: I have not been able to use cocain enough at one sitting to do much good, so for two years I have used a 2 per cent solution of trichloracetic acid before removing these deposits. Dry the gum, wrap cotton around a thin scaler and dip in solution, then carry cotton all around deposit and leave it there for a moment. The astringent action prevents hemorrhage, and the acid has all the deadening effect of cocain.

Dr. C. P. Pruyn: It is impossible to do much without thorough education of the patients. Where the deposit has not progressed to annoyance, unless the gravity of the situation is impressed upon them, they think you are too cautious, or are trying to make work. When patients are given to understand what the results will be if the deposits are not removed, some success may be attained. I think the essayist's solution of cocain is not strong enough. When used locally a 10 to 20 per cent solution is not dangerous and gives better results.

Dr. Don M. Gallie: In mouths where the teeth are surrounded by calcareous deposits, we more frequently find the inferior incisors injured by the deposits than any other teeth in the mouth. I recall a case that came under my care over five years ago, where the lower incisors were so loose from deposits that there was danger of removing the teeth by using the ordinary methods of scaling. To guard against this I took a strip of modeling composition and took a shallow impression of the anterior teeth, allowed it to harden in ice-water, then trimmed the strip labio-lingually until it was about one-quarter of an inch thick, and placed it back upon the cutting edges of the teeth, thus holding them all firmly in place. It was then an easy matter to remove the immense deposits that were present, and after scaling as thoroughly as possible I ligated the teeth together, allowing the strip to remain until they were all firmly ligated. I used the strip at each subsequent sitting. About three weeks ago I saw the patient for the first time since the operation was completed and was pleased to see the teeth firmly attached and the gum considerably restored, owing mainly, in my opinion, to the method employed.

Dr. C. F. Hartt: One theory advanced to account for the formation of calcareous deposits is, that the lime-salts in the saliva are precipitated by the carbonic acid in the breath, and so form on the teeth. It would therefore seem inadvisable to prescribe carbonized waters, as the essayist has suggested.

SWALLOWED HIS FALSE TEETH.—The Ottumwa, Iowa, paper reports that the Rev. Thomas W. Russell, a prominent divine of that city, died suddenly from cerebral apoplexy, which was induced by the presence in his stomach of a plate of false teeth. A physician was called, but could give no assistance, and the unfortunate man died in thirty minutes after swallowing the plate.

FOREIGN BODIES IN THE TONGUE.—Dr. Anderson, of Melbourne, after removing a piece of an amber mouth-piece, one inch in length and half an inch in width and thickness, from the tongue, says: "Instances of the long retention of foreign bodies in the tongue are not so uncommon as might be supposed. In the *Lancet* of 1846, mention is made of the case of a German soldier who received a bullet wound, passing through the cheek, jaw, tongue and out of the mouth on the opposite side. The wounds healed in a few weeks, but repeated suppuration occurred in the tongue, and thirty-two years after the original injury there was extracted from the substance of the tongue a molar tooth."—*Brit. Jour. Dent. Sc.*

Digests.

METHOD OF TREATING PULPLESS TEETH. By Dr. H. C. Gilchrist, Nyack, N. Y. Read at 2nd District Society, October, 1896. My method of treating dead teeth has been very successful during fifteen years of practice. Where there is a great amount of inflammation and swelling, the suppurative stage approaching, I first open the pulp-chamber to release the confined gases. I then cut a small disk from blotting paper, about three-eighths of an inch in diameter, which I saturate with chloroform and apply directly over the root of the diseased tooth, covering the same with a little larger disk of rubber-dam to protect the lips or cheek from being blistered. Two or three of these applications will in a few moments produce a small blister and soften the gum tissue. I then paint the parts thoroughly with iodin and aconite, equal parts, and, giving some capsicum plasters to use over the affected part, I dismiss my patient until the following day. In the majority of cases when the patient returns I find that the abscess is discharging through the gum where I produced my blister with the chloroform disk, and that the inflammation has somewhat subsided. If not discharging, it is ready to be lanced. I then cleanse the canals with Donaldson broaches, wash out thoroughly with water, as hot as the patient can bear, following with bichlorid of mercury (1-10,000). Then, making a piston of a broach wrapped with cotton, I carefully force beechwood creosote through the canal until it appears upon the gum. In very obstinate cases I use chlorid of zinc, ten grains to the ounce. I then place in the canals a dressing of cotton saturated with the following preparation: One-half ounce iodoform; creosote of sufficient quantity to make a thin paste, to which add half dram of oil of cinnamon, which, while acting as a germicide, also disguises the odor of the iodoform. This combination has given me more satisfaction than any that I have ever used. It is very rare that it is necessary to make more than the second application to effect a cure.

If the tooth is in a quiescent state when I begin I open the pulp-chamber and, after thoroughly cleaning out the canals, wash with hot water and bichlorid of mercury, then pack the canals with cot-

ton saturated with spirits of camphor, leaving it in for twenty-four hours. When the patient returns I pursue the same treatment with my iodoform preparation as before mentioned.

When the tooth is ready for filling I adjust the rubber-dam, wash out the canals with alcohol and follow with chloroform, which I evaporate with hot air. If I have found it necessary to drill through the foramen I fill the canals with gutta-percha point dipped in chloro-percha, which I force in with a warm instrument; otherwise I use my preparation of iodoform, mixed in a thin paste of phosphate of zinc, to which I add a few shreds of cotton, which can be readily forced up to the end of the root.

Once in a while I meet an obstinate case where some constitutional disturbance causes a great deal of trouble, but with perseverance it can usually be conquered. Recently, when there has been a great deal of pain, I have prescribed ammonol in ten grain doses, with satisfactory results. But I must confess that I have met a few cases where all the prescribed methods have failed In these I extract the tooth, excise the end of the root, wash out the socket with bichlorid of mercury, and after filling the canal with gutta-percha, return the tooth to its former position, tying it fast to the adjoining teeth. The first tooth that I treated in this way was a superior central incisor. That was fifteen years ago and it is still in the mouth, doing good service. Since then I have treated a number in the same way with good success, they being limited to incisors, canines and bicuspids.—*Items of Interest, January, 1897.*

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COMBINATION PLATE AND BRIDGE WORK. By Dr. A. S. Condit, Findlay, O. Read before Pennsylvania State Dental Society, 1896. After a careful examination we should be able to decide upon the applicability of the different systems of work in respect to usefulness, appearance, durability and comfort. This necessarily requires a familiarity with all classes of work. If this thorough knowledge were possessed, we would never use a fixed bridge whose abutments would not be sufficiently strong to offer the needed resistance, either because of a lack of firmness or too long a span. Neither would we use a plate attached by a clasp to the natural teeth when the friction caused by the lateral motion in mastication would tend to loosen the teeth clasped, so that in time they would give away.

Admitting that the teeth used for the supports of a fixed bridge will give way if overworked, and the well-known evils resulting from the use of a plate, especially if retained by a clasp, is it not reasonable to suppose that if the teeth adjacent to the space to be filled with the artificial denture were first crowned or banded to prevent wear or decay, and attachments were placed thereon and a plate made to rest both upon the teeth and gums, receiving an equal support from both, that we would read nature's demands in a better manner than in any other way? If a workman attempts to make any one method meet all cases, is not failure the inevitable result? Fixed bridge-work, the ordinary plate, the portable bridge, all have their place in dentistry. We must discriminate between them, and use the right one in the right place, making our work an individual operation adapted to each case, which will insure higher results and the greater good to patients.

All workmen will not take this unprejudiced view of work. One capable workman says, I have inserted two full upper portable bridges that are giving perfect satisfaction, in one of the cases the third molars being the only support. Another says that if all removable bridges are not failures it is not the fault of the construction, but due to the favoring of the appliance on the part of the person wearing the denture or to the absence of occluding teeth.

A few weeks ago it was my privilege to examine a full upper denture without any plate covering the palate and with but one support. It had been worn for four years, and, as far as I could see, was perfectly satisfactory. The same person was wearing a full lower denture with two supports, and it was as firm as fixed bridge-work. I could mention many similar cases.

It is generally agreed that the two most commendable features of fixed bridge-work are firmness and the retention of their supports in their proper relative positions; but firmness is obtained at the expense of the elasticity which is characteristic of the natural organs, and especially the teeth. This is not so in removable work, as there is a yielding of the denture proportionate to the texture of the subjacent tissue.

In combining the plate and bridge we get most of the good qualities of each class of work without the strong objections that each possesses when used alone. The pressure is divided and distributed between the attachment teeth and the subjacent tissue.

The work is held firmly, and the attachment teeth are held in their normal positions. The space which in bridge-work is left for cleansing is filled up. The work can be removed and replaced at the pleasure of the wearer, and when the denture is removed both the work and the mouth can be thoroughly cleansed. One notable advantage of this class of work for the upper jaw is that the surface of the plate which rests upon the gums need be only wide enough to cover the ridge, and thus avoid the common interference of artificial dentures with taste and speech.

For holding the combination plate and bridge-work in place I have devised an attachment. It consists of an open gold clasp tube, 26 gauge, which is soldered to the crown; also another telescoping tube which is called the shield, closed at one end, with a round, tapering pin in the center, a trifle larger than the tube; and a V-shaped metal strip on the side of the telescoping tube, which I have named the ear.

A correct understanding of the construction of the attachment and the principle of its workings is quite important. As the pin passes into the tube, which is a trifle smaller, it embraces the pin with a tension proportionate to the spring. The outside telescoping tube fitting closely on both sides of the inner tube prevents any rotation, while also shielding the pin. The ear is for the purpose of giving a firmer hold into the plate, but it is not used for metal or continuous-gum work.

The attachments are uniform in size and interchangeable. They are sufficiently long for any case, but in close bites it will be necessary to shorten the attachment to correspond with the articulation. If there should be unequal absorption of the ridge, which might occur in a one-attachment case, the tube may be shortened and the work brought as close to the ridge as desired.

I have also devised an implement called the guide, which is used in setting the tubes in a two-attachment case, vertical and parallel with each other. Any dentist who can make a crown will experience no difficulty in making the work. In places where but one attachment is used, as in substituting the lower molars, much will depend upon the shape and texture of the ridge; for if the ridge were flat and the gums soft and spongy, the liability to induce strain upon the attachment tooth would be increased; but if the ridge is high and the gums hard, but little, if any, strain will be brought to

bear upon the attachment tooth. I have several practical cases now in use that seem to be as serviceable as a fixed bridge with second bicuspids and molars, with a single attachment to the lower first bicuspid.

The success of such cases depends largely upon the support given by the alveolar ridge. As the contact of the work with the ridge is controlled by the attachment, which can be adjusted to suit the case, there is not that undue absorption of the gums that occurs when the work is held in place by a clasp.

I consider this method especially adapted in substituting the lower incisors. The principal advantages arising from using this method in this case are that the cuspids are held firmly in place, no undue strain is placed upon the gums, and the work can be removed and thoroughly cleansed. If fixed bridge-work were used it would be difficult to adjust, on account of the leaning conditions of the cuspids.

Every workman knows how unsatisfactory a plate is in the work of mastication where none but the six anterior teeth remain, especially if there is but little ridge. My plan of constructing such a case is to band or crown the cuspids and couple them together back of the front teeth with a heavy iridio-platinum bar, the same as in making an ordinary plate. I have found this method of attachment fully as useful for many places in the upper jaw as in the lower, especially if the teeth are all gone on one side and not on the other. —*Dental Cosmos, January, 1897.*

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INFANTILE SCORBUTUS. By Joseph Boylston, D.D.S., Portsmouth, N. H. Knowing that infantile scorbutus is a disease which has been but little discussed among dentists, it is my desire to report a case which, being my own child, I have studied more or less carefully. I will give a history of the child's life and condition up to the time when the disease first showed itself. She was, like many babies, subject to severe colic during the first few weeks of her life, and fresh cow's milk prepared with peptogenic milk powder seemed to be the only thing which she could take with no evil results. I would say, for the benefit of those who have had no experience with this preparation, that it is a powder composed of sugar of milk, extract of pancreas, and bicarbonate of soda. The fresh milk was brought to us in sealed jars, sometimes reaching us

while still warm from the cow, and was immediately prepared in the following manner, as directed on the bottle of the powder: To half-pint measure of milk was added one-quarter pint of barley water, four tablespoonfuls of cream, and one measure of the powder. The whole was then stirred, put into a tightly stoppered sterilized bottle and placed in a kettle of water at 115 degrees and bathed for twenty minutes. It was then poured into a sterilized graniteware dish and quickly brought to just the point of boiling, then taken off and poured into smaller bottles, each containing enough for one feeding, and stopped with a plug of absorbent cotton.

The child thrived on this until she was eight and one-half months old, when she began to weaken and grow peevish. A slight purplish swelling appeared in the gums around one of the five teeth then erupted. The swelling rapidly spread to the gums around the other teeth, and her mother insisted that the child had bruised its own gums by some fall or by biting. At about this time we noticed dark spots giving a sort of mottled appearance to the flesh over the shoulder joints, followed very soon by the same appearance about the thighs and legs. By this time the baby refused to stand or put her feet in any position which would bring the slightest pressure on her hips; she objected to being handled, or even moved or bathed, and her cries of a few days previous had become an almost constant moan. The knees were drawn up to her body, and any attempt to straighten her legs caused her to scream with pain. I consulted a number of physicians, none of whom knew what was the trouble or could suggest a remedy.

I remembered seeing the report of a discussion started by Dr. Rhein in which a condition was described which closely resembled the case in hand. I re-read the discussion and also the paper by Dr. Kirk referred to in it, and went to work on the line of treatment advised by the speakers. In order to make assurance doubly sure I again called in a physician, gave him the articles to read, and he agreed with me in the diagnosis.

The child was given fresh milk without the powder, the juice of an orange each day, and juice of beef obtained by slight broiling and expressed with an ordinary lemon-squeezer. The beef was alternated with a soft-boiled egg. In two days a decided improvement was noticeable and in three weeks she had apparently entirely recovered.

I would say that during the continuance of the disease all development of the teeth seemed to stop; but there was no breaking down of the enamel nor loosening of the teeth, and just as soon as she recovered the development was resumed and four teeth were simultaneously erupted with almost no irritation. There seemed to be no derangement of the bowels except perhaps a very slight tendency to constipation.—*Items of Interest, January, 1897.*

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CALENDULA IN DENTISTRY. By Dr. W. I. Wallace, Montgomery, N. Y. Read at 2nd District Society, October, 1896. Calendula officinalis is the scientific name for the English marigold, whose blossoms much resemble those of the arnica plant, with which I presume every one is familiar. The tincture is prepared from these blossoms in the same manner as arnica, by covering the flowers in a jar with alcohol and allowing them to stand several days. The flower or tincture can be purchased from any homeopathic pharmacy. The provings of this drug show it to have a powerful action in suppurative conditions.

Upon taking up dentistry I saw in calendula a remedy valuable in all such conditions. In the presence of putrescent pulps, after washing out the canal with warm water, or one-half per cent solution of ammonia, to remove the decomposed matter, pump in calendula with a broach wound with cotton, and then pack the canal with cotton saturated with calendula. If an old case, with an abscess at the apex of the root, with or without fistula, two or three treatments twenty-four hours apart will be necessary. If an acute abscess, it must be evacuated first.

Destruction and absorption of the pyogenic membrane or pus sac are rapidly caused by this medicine. In acute abscess, located in the alveolar process, after lancing gradually inject an ordinary hypodermic syringeful of the tincture, pressing around it frequently to force into all parts and to rinse out the sac, but leaving a small quantity in when through. This will generally be all the treatment required, though a second injection is sometimes necessary.

Another use is in pyorrhea, where this remedy is certainly indicated and has proved very satisfactory in my hands. Inject a few drops with hypodermic syringe, passing the needle close to the root, to the bottom of the sac. If daily treatments can be given a speedy cure should follow. The internal administration of twenty

drops in half a glass of water, a teaspoonful every three hours until all is taken, will assist in the cure.

A pledget of cotton saturated with the tincture and placed in the alveolus after extraction will aid in the rapid healing and filling up of the socket, as this remedy applied to a wound will cause it to heal without suppuration, leaving almost no scar.

Calendula stimulates proliferation of white blood corpuscles; increases quantity of fibrin and aids its transformation into connective tissue; induces healing by first intention; promotes granulation and prevents disfiguring scars; promotes favorable cicatrization with least amount of suppuration; prevents or arrests gangrene, and aids in healing or reproducing bone.—*Items of Interest, January, 1897.*

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THE PHYSICAL PROPERTIES OF THE SILVER-TIN AMALGAMS. By G. V. Black, M.D., D.D.S. The article in the *Cosmos* for July, 1895, devoted to the study of the *flow* of amalgams, might be regarded as conclusive and final but for later discoveries modifying the degree in which this property is influenced by what is known as aging, and the differences due to formula. The instrumental facts given in the study of expansion and shrinkage of the silver-tin amalgams in issue of August, 1895, have been confirmed at every turn in the progress of the work. The article in the issue of January, 1896, announced the discovery of the effects on shrinkage and expansion accompanying the change produced by the lapse of time after alloys are cut—known as *aging*. Enough results produced by artificial aging for a number of formulæ were given to show that the effect is universal, but differing in degree with different formulæ. It seemed to be demonstrated that what had been known as aging was a slight oxidation of the cut alloy by which its chemical relations to mercury were profoundly changed. The change is such that when an alloy is made into an amalgam immediately after being cut, and is found not to shrink, or may expand, it will be found to shrink after the aging has occurred. This has been abundantly confirmed by further studies so far as the production of shrinkage is concerned. The instrumental facts were right but my deductions were wrong.

Under the supposition that the change was brought about by oxidation, alloys were put up in corked bottles, in long tubes partly filled, corked with cotton and inverted, so that with every change

of temperature the air would be drawn in and forced out through the cut alloy. Alloys were put up in glass tubes, packed full and hermetically sealed; some of these were wrapped in tin-foil, others exposed freely to the light, some kept in an ordinary drawer without especial precautions. Some were hermetically sealed in large tubes that were damp and but partly filled with alloy, to be constantly in contact with moisture. The formula for this work was—silver 65, tin 35. Others were used for comparison. The unit of measurement is one-ten-thousandth of an inch, indicated by the word *point*. The alloys were put up at intervals between October, 1895, and January, 1896. Examinations began about the middle of March. Those put up in hermetically sealed tubes in October gave a shrinkage of five points, in January two points. Those put up damp gave the same results as those put up dry; those exposed to the light the same as those excluded from the light. Those in corked bottles give the same results as those in hermetically sealed tubes. Those subjected to frequent changes of air showed no difference from those in corked bottles or hermetically sealed tubes. Those put up in October gave five points shrinkage; those in January two points. Tubes put up in November and December gave intermediate results. Five points was the general result for the older alloys, two points for those put up the shorter time. Practically the results were uniform. Alloys laid away in the ingot seem to suffer no change.

Circumstances led to putting a part of the alloys put up in January into a case in an adjoining room. In testing these I was surprised by a shrinkage of eight to nine points, instead of two, as had occurred with those kept in the drawer of my desk. The difference in the two rooms was one of temperature. During an absence from January 8 to March 10 the room in which my desk stood was abandoned to the cold. The case in which the tubes were placed stood near the heater in the other room, often becoming very warm. To probe the theory of oxidation more thoroughly air was thoroughly excluded from alloy in tubes by the introduction of gases and the tubes hermetically sealed. Part were laid away for aging by time and part artificially aged. The result from the agings was substantially nine points in each case—the hydrogen, nitrogen and oxygen tubes giving like results. Another experiment in handling the alloys without any exposure to the air gave substantially a shrinkage of nine points.

It is therefore shown that the change in the alloy is not dependent on the presence or absence of oxygen. Oxidation has nothing to do with it. *It is not a chemical agent acting upon the alloy from without.*

All of the evidence now seemed to point to temperature as the one factor producing these changes in cut alloys. All formulæ tried had been affected in a similar manner but in varying degrees. The change occurs in the metal itself, and seems to occur more rapidly in high than in low temperatures.

In the study of thermal influences on cut alloys I obtained the use of a section of a vat in an ice-plant, containing the cold brine in which ice is made. Tubes of alloy were hermetically sealed and sunk in this cold brine, and controls of the same cutting were deposited in my drawer for comparison. An ice-tank was arranged for keeping cut alloys at the temperature of melting ice, and cut alloys, both in sealed tubes and corked bottles, were placed in it for future tests. Sealed tubes of alloy were hung in my south window between the glass and a heavy paper curtain where they would receive the full light and heat of the sun. Some of these were protected from the light by wrapping in tin-foil. My incubating ovens for the culture of microorganisms were brought into use for evenly maintaining temperatures between room temperature and that of boiling water. These proved most valuable, maintaining any desired temperature for any length of time without variation. As I was ignorant of what to expect from the lower temperatures, frequent examinations had to be made to note the progress of the effects of different temperatures.

On the alloys hung in the window the first effect was a marked change in the working property. The harshness and quickness of setting of a fresh cut alloy containing as much as 65 per cent of silver was notably modified in two days, so that the alloy could be worked with more ease and leisure. Within a week, however, the fillings came to shrink and the margins to show shrinkage gaps on microscopic examination. In three weeks they came to shrink seven to eight points. The tubes wrapped in tin-foil were placed side by side with those fully exposed to the light. The result was the same in both sets of tubes. The highest temperature noted on these tubes was 105 degrees F.; it rarely exceeded 95 degrees. At 140 degrees in the ovens cut alloys came to shrink very quickly, the

full limit of shrinkage occurring in from six to twelve hours. At 130 degrees the effect was slower, but the shrinkage of the formula silver 65, tin 35, was greater than any other—ten points instead of nine, in one case eleven. With 120 degrees the effect was still slower, the shrinkage seemed to stop at about nine points. The full effect seemed to be produced in three days and a half. 110 degrees were also found to affect the alloys promptly. In all of these experiments in aging in the incubating ovens (low temperature aging) the most salutary effect in the working property of the alloys was noticeably the lowest temperatures producing the best results.

The alloys placed in cold brine showed no perceptible change at the end of six weeks. The alloys placed on ice showed a marked change at the end of fifteen days, working much softer and not setting so quickly. At the end of three months the test fillings did not stand up so sharply as at first; at the end of five months there was a shrinkage of two points. A severe test of aging by shaking apart from thermal influences resulted in no change. In this way I have tried one thing after another, until I have excluded everything that has been suggested to my mind as possibly affecting the physical characters of cut alloys, and gradually it has been narrowed down to the one factor, thermal influences. With the alloy, silver 65, tin 35, the shrinkage produced by subjecting it to the temperature of boiling water has been nine points quite uniformly. That shrinkage was exceeded only by subjecting the alloy to 130 degrees continuously for a number of days, and after that degree of shrinkage was produced a longer continuance of that temperature seemed to produce no further effect. Substantially the same effect has been produced with each alloy that has been subjected to trial, only that there has been a difference in the amount of shrinkage produced. In other words, each alloy is found to have a fairly definite *shrinkage expansion range*. In some this range is all shrinkage, in others it is all expansion, and in still others it is both. Unmodified silver-tin alloys (those that contain no other metal) having 75 per cent of silver, or more, expand only. They cannot be made to shrink by aging, though their expansion can be greatly modified. The unmodified alloys containing as much as 65 per cent of silver and less than 75 per cent expand when fresh cut, and shrink when fully aged. Those alloys containing as much as 50 per cent of silver and up to

61 or 62 per cent shrink only, but shrink much more when aged than when used fresh cut. Those that contain less than 50 per cent of silver first shrink and then expand. When used fresh cut the expansion is the greater; when aged the shrinkage is the greater. Alloys containing from 65 to 75 per cent are hard and make hard, quick-setting amalgams; they make also the strongest amalgams that can be made of silver and tin. Alloys containing less than 60 per cent of silver are soft, and make soft, slow-setting amalgams. These grade into the group above somewhat gradually. Alloys containing more than 75 per cent of silver are soft, and make frail, slow-setting amalgams. The slow-setting occurs somewhat suddenly, after passing 75 per cent. These subdivisions of the silver-tin alloys are sufficiently distinct to be of much value in studying the possibilities of the silver-tin amalgams. The group between 65 and 75 per cent of silver must be our dependence in the consideration of the unmodified alloys for filling teeth. All of them are readily brought to the point of neither shrinkage nor expansion by what I shall call fractional aging, or fractional annealing or tempering. Hereafter I shall use the term annealing when artificial aging is meant. For instance, the alloy silver 70, tin 30, expands fourteen points when fresh-cut, and shrinks seven points when fully annealed. It requires only a few experiments with annealing this alloy in the incubating ovens to be able to stop off the annealing when the zero line is reached, and this is true of any alloy of this group. The next question is, will it remain at this point? Experiment has shown that this formula will not; it will come to shrink more by *time* at common temperatures. Will any alloy do so? The suggested explanation is this: In the cutting of an alloy the violence used hardens it, producing an allotropic condition of the metal, in which its chemical relations to mercury are profoundly changed. High temperatures, or even ordinary temperatures acting for a considerable time, have the effect of annealing the cut alloy and restoring its normal condition. If this explanation holds good, an alloy that has been fully aged or annealed—that is, brought to its normal condition—should remain in that condition indefinitely, at normal temperature. The first experiment on this theory, in April last, was to harden a portion of an ingot as much as possible by hammering and compare cuttings from this with cuttings from the contiguous portion of the ingot not hammered. It could not be ham-

mered very much because of its brittleness, but it was in some degree flattened and drawn. The tests showed an increase in expansion of four points. The next thing to do was to find an alloy that would neither shrink nor expand when fully annealed, also to learn what constitutes full annealing, and then to test these annealed specimens by time; indeed, to test the theory in all its bearings. To this end I had a number of formulæ cast and began annealing them to the zero line, trying at first the boiling water method and then abandoning it in favor of the ovens. The result showed that the range of formulæ of the unmodified silver-tin alloys would have to be limited to that lying between 70 of silver to 30 of tin, and 75 of silver to 25 of tin. The former annealed to zero would come to shrink more in summer temperature. The latter could not be held down to the zero line. When the alloy silver 75, tin 25, is used fresh-cut it gives about sixty points expansion; varying considerably in different fillings, as is always the case with great movements, whether up or down. In the upward movement the filling rises squarely up above the margins of the cavity without spheroiding, if the cavity-walls are parallel and very smooth. If the cavity-walls are rough or uneven it will spheroid (round up in the center) or take various shapes as it is held down more or less by various portions of the cavity-walls, and the measurements will vary accordingly. When the condition of the alloy is such that the movement is very slight, the results are very constant. Ten minutes annealing of this alloy (silver 75, tin 25) in boiling water was insufficient; fifteen minutes reduced the expansion to six points; thirty minutes, then one hour, produced no change. Annealing in glycerol at 300 degrees F. for half an hour reduced the expansion to one and a half points. The alloy thus annealed was distributed in different positions to test its staying qualities. In corked bottles some was placed in my drawer and some in the south window in the sun. In a month all expanded five and six points. This seemed to demonstrate that an alloy could be overannealed, so that in normal temperatures it would gravitate back to a condition of expansion. Here a danger was pointed out to be avoided in the annealing and tempering of alloys.

The plan developed for this annealing is what I call the fractional plan or fractional annealing. The alloy was tested as to its full annealing point by fifteen minutes in boiling water. If it came to

or slightly below the zero line, not more than three points below, I tried the fractional annealing. The alloy was placed in the oven at 120 degrees F. and allowed to remain six hours. Now the whole of the alloy was removed to room temperature and a test filling made and the result determined, which usually requires twenty-four hours. The alloy is found to expand six points (I am reciting actual experiment). It is now returned to the oven for another six hours, for it has been learned that the last part of the reduction is much slower than the first. Then the whole of the alloy is again removed to room temperature and another test made. In this test it is still found to expand two points. It is again returned to the oven for three hours and a third test is made. Two fillings measured with great care give respectively one-half point and one point expansion; and it is decided to distribute the alloy for a test of its staying qualities.

Latterly, after the primary examination by boiling fifteen minutes to find the point at which it will anneal, a sample of the alloy sufficient for three or four test fillings is put into the oven and tested in six, nine, twelve and perhaps fifteen or eighteen hours, depending on the progress shown by the first test. From these tests the time for annealing is determined and it is put into the oven for that time. If the alloy has come down to three points by the boiling-water test, it will require less time in the oven than when this test has reduced it one point only. Preparations from five ingots of alloy representing five different melts, annealed to zero in the ways mentioned, or within one point of zero, have passed through the heated term of this summer without material change. The oldest one was prepared and distributed April 27. One sample was placed in my drawer, one was put in a cool place at first, later on ice, and a third was hung in my south window between the glass and a heavy paper curtain, where it was exposed to the full rays of the sun; and it stayed there until the last test filling was made on the 5th of October. In this way I tried to imitate the utmost heat of summer and the winter's cold. The greatest variation from this alloy has been two points. Six fillings made within a few days after the tempering gave expansion 1—, ½, 0, 1, 0, 0, respectively. I regard these variations as being within the limits of error. Of the test fillings made at intervals during the summer, one from the bottle in my drawer gave two points expansion, and one from the bottle in the window, the last

may be greatly modified by changes in the amount of mercury and the mode of manipulation.

There is one thing that troubles me and leads me to suspect that there is some influence not yet discovered acting to modify the shrinkage and expansion of alloys. Among the cut alloys that have come to me there are several samples that give a shrinkage of from twenty to twenty-four points. This also appeared in the fillings made at the Illinois State Dental Society last May, as well as I could make out by microscopic reading. The greatest shrinkage I have been able to obtain from alloys cut by myself has been eighteen points.

Alloys containing from 50 to 60 per cent of silver, when used fresh cut, do not shrink much, and when used in this condition make fair fillings. When I say *fresh cut I mean that the alloy is used within one hour after cutting.*

When we pass on to 65 parts of silver we begin to have expansion of the fresh cut alloy, and at the same time pass into the group of hard alloys. From this on to the proportion of 75 parts of silver the increase in expansion is very rapid and the alloys are correspondingly sensitive to slight changes in the exact formula. By the steps of 5 and 2½ per cent we get one point expansion at 65 per cent of silver, and, successively, fourteen at 70, forty-two at 72½ and sixty points at 75 per cent of silver. The shrinkage when annealed is reduced less rapidly, and, therefore, the expansion shrinkage range is continually increased. Beginning with the annealed alloy with 65 parts of silver we have, according to the new tubes, ten points shrinkage, and successively seven with 75 per cent, three with 72½, and then pass to six points expansion in the annealed alloy with 75 per cent of silver. As the formulæ for ingots for the production of tempered alloys by the process of fractional annealing must give a shrinkage of not more than three points, and possibly only two should be admitted, and must not expand when fully annealed, the reader may realize how close is the margin, and how accurate the work must be if their manufacture is really successful. We may have other alloys, but the exactness required will be none the less.

I will now consider the *flow* and the *strength* of amalgams under stress. With silver 40, tin 60 parts the flow is 40 per cent for the fresh cut, and nearly 45 per cent for annealed alloy. Taking the individual blocks, the variations were from 33 per cent to 54. It will

one, gave zero. The alloy kept on ice was removed to room temperature September 5, and a filling made from it October 21 gave zero. All the rest of the fillings gave either one expansion or a fraction that failed to reach either one above or one below that figure.

The other successful temperings were put up May 5, May 21, June 5 and June 15, so that all were in time for the heated term of July and August, which is the severest test of the seasons. Of these none has varied so much as two points, and they have therefore been closer than the first. They were all kept in the drawer. These successful temperings seem to me to establish a very important principle and demonstrate that we can have alloys that will retain their physical characters for a sufficient time, if not permanently. The time, only a little over five months, may not be sufficient for a full test; years will be required, but the time being that of the severest test possible—the hottest months of the year—adds greatly to its value.

The great shrinkage we get with the formulæ containing from 50 to 60 per cent of silver can be much modified by the proportion of mercury in the mix, and the time at which the mass is packed in relation to the time of mixing. These shrinkages occur quickly, often one-half occurring within the first two hours after the filling is made. If the packing of the mass is delayed as much as possible and the filling made *dead hard* the shrinkage will be less. If so little mercury is mixed with the mass that it will only make a dark powder that can be made to cohere by strong pressure, the shrinkage will not be so great If so much mercury is mixed with the alloy as to make a very sloppy mass, and this is put in without removing any of it, the shrink will be considerably reduced. None of these prevent shrinkage, they only modify the amount. The two latter methods make very frail amalgams and none of them is suitable for filling teeth. With an alloy in condition to neither shrink nor expand, these influences seem to be inoperative in all of them. If the alloy is in condition to form a compound that neither shrinks nor expands in setting, no manipulation to which I subjected it will cause it to vary from it. I am therefore able to make filling after filling that will measure alike (or within what I regard as the range of error in measurement, about one point) and show no break of the margins on microscopic examination. The flow and crushing stress

Gold.—The addition of gold in the proportion of 5 per cent seems to give a little softer working property and slows the setting of the mass. The mass has something more of the pasty character, and the fillings made of the annealed alloy are apt to finish very soft, the surface being so springy that it is difficult to make a good finish. It takes less mercury than the unmodified alloy, and the flow is a little more. The amalgam is very tough and bears a heavy stress before crushing. The shrinkage expansion range is reduced three points.

Platinum.—The appearance of the mass made from this alloy is very remarkable. That from the fresh cut alloy is fairly white, but that from the annealed alloy is very dark and, in kneading, blackens the hand to an extraordinary degree with a grayish-blue black that is rather difficult to remove. The mass looks dirty and the finished filling is dark. The mass has a peculiar softness to the feel under the instrument. The setting is slowed considerably. It flows badly. The shrinkage expansion range is increased and lies a little higher in the scale.

Copper.—This alloy, fresh cut, sets very quickly. The mass makes up soft but becomes hard almost immediately it is left to itself. I had some difficulty in getting good fillings of the fresh cut alloy on account of this extreme quickness of setting. The annealed alloy makes a very soft, pleasant-looking mass, and the setting is as slow as in the unmodified alloy. Expansion and the expansion shrinkage range is markedly increased, the flow is diminished, and the crushing stress is the greatest of the series.

Zinc.—This alloy is very remarkable for the amount and *slowness* of its expansion. It expansion was so slow that I evidently overlooked the fact that it was still expanding in the first series of fillings made from the first ingot. But a second series from the first, and all of the fillings from the second ingot were followed to the time of writing, and I feel certain that the expansion has ceased. In the fresh cut alloy the expansion continued forty days. The expansion in the fillings from the annealed alloy, which gave but nine points, was not completed until thirty days had elapsed. The mass from this alloy is also remarkable for its adhesion to the walls of the cavity. The fresh-cut alloy set so quickly that I had much difficulty in getting good fillings. With the annealed alloy this was much improved, but it still set very quickly. Otherwise the mass from

be noted the flow of the annealed alloy is the greater. The annealed alloy makes the softer and tougher amalgam. This is the general rule, though the difference fades almost entirely away with the larger proportions of silver. Inversions of this rule frequently occur in experimental work in which the blocks from the annealed alloy give the lesser flow. As the resistance to flow is sharply influenced by the proportion of mercury, either too much or too little weakening it, also by the degree of perfection of the manipulation, this could hardly be otherwise. An amalgam that will give 40 per cent flow in one hour under a stress of sixty pounds is not suitable for filling teeth in any position in which the stress of mastication comes upon it. No matter how well it may be seated in the cavity, and even if it did not shrink or expand, it could be only a question of time, and not a long time either, when it would be moved by the stress of mastication and begin to leak; unless indeed the power of mastication is much below par. In resistance to crushing this alloy is also the weakest of the series. It will be noted that the resistance to flow increases with the increase of silver, and there is a notable increase in this resistance at 65 per cent, or when we enter the group of hard alloys. Through this group there is not much variation until 75 per cent of silver is reached, when the resistance to both flow and crushing begins to decline, and, I may say, continues slowly to pure silver.

Alloys to which other metals have been added with the idea of modifying their chemical or physical properties I shall call *modified* silver-tin alloys. For some years it has been the habit of many manufacturers of alloys to add other metals with the idea, I think, of improvement in the chemical qualities of the amalgam, though some seem to have had in view the improvement of the physical qualities as well. The study I now give is to be regarded as primary, the question being, what modifications are produced by moderate additions of other metals? and is intended to serve as a basis for finding formulæ for modified alloys of suitable physical qualities for filling teeth, not for pointing out the specific compounds. To this end I have selected the formula silver 65, tin 35, as a basis upon which a temporary trial of the metals usually used for the modifications should be made. To this formula I have added gold, platinum, copper, zinc, bismuth, cadmium, lead, and aluminum, separately in the proportion of 5 per cent in each instance.

young man, to crown an upper lateral which had been broken by an accident. As I had to destroy the pulp I applied arsenic and removed it within a few hours, using cocain with the electric current. I was compelled to apply the cocain higher and higher up in the canals in order to complete the operation with perfect anesthesia. At the end of twenty minutes I noticed that the pupils of my patient's eyes were much dilated. I was working by gas-light and consequently did not observe any difference in his color. I asked him whether he felt all right, and he replied that he noticed an increasing sense of discomfort and was feeling very faint. I fortunately had no difficulty in restoring him by administering several strong doses of whisky, and was enabled to complete the operation. I had not used much cocain and had not applied it continuously. It has always seemed to me that the quantity used is no criterion, as one subject will support much less than another.

I subsequently discovered that in this particular case the foramen was abnormally large, thus allowing the more ready passage of the current and of the cocain.—*Items of Interest, January, 1897.*

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SENSITIVE DENTIN. By George F. Cheney, D.D.S., St. Johnsbury, Vt. Read before Anniversary Meeting of Chicago Dental Society, February 1, 1897. A year and a half or so ago I received an invitation to prepare a paper for one of our eastern societies. At that time a great deal was being said by a certain class of dentists regarding painless dentistry. My thought was, if these men can do all their dental operations painlessly, some of our leading professional men will have some knowledge of it. I conceived the idea of sending a list of questions to about seventy-five of the leading men in the United States, hoping that I might gain some information, if not solve the problem. I certainly got a great deal of valuable information, but the question is still unsolved.

Soon after sending out these letters my office was burned, together with all my dental journals and part of my books; consequently I gave up the preparation of the paper until an invitation was received from your society.

The questions sent out were as follows: 1. What is the cause of sensitive dentin? 2. Is it an abnormal condition? 3. Do the dentinal fibers directly anastomose with the nerve fibers of the pulp, or is there an indirect connection of the two established through the

the annealed alloy worked very well. The flow is decidedly decreased and is the least of the series of alloys, while the resistance to crushing is good. In the handling it gives strongly the impression of brittleness. This alloy requires more mercury than the unmodified alloys.

Aluminum.—The first effort to make a filling of the alloy containing 5 per cent of aluminum was a failure. It amalgamated nicely, forming a very white, soft mass, but it was soon too hot to handle. It ran the mercury up to 186 degrees F.; it then began to fall into a dark powder and soon disintegrated. The powder cohered a little with pressure. I finally made several fillings before disintegration began. The fillings have expanded enormously, 445 points in forty-three days. Other ingots were made with 1 per cent of aluminum. The heat of this mixture was not too great for handling. While in the scale pan the mass became visibly larger; on placing it in the palm of the hand a distinct crepitus of bursting gas bubbles was heard. When kneaded out the gas reformed. After several kneadings a filling was made. When first mixed the mass is white but grows dark with the generation of gas. The working property is so soft and the setting so slow there is time to spare. When annealed the setting is very slow and the mass is peculiar for its softness and apparent dryness. It also generated gas. Filling from the fresh-cut alloy gave 166 points expansion in forty-four days. It adheres to the tube and rounds up in the center. Fillings from annealed alloy gave twenty-five to forty-eight points expansion; the sample annealed in boiling water expanding most and that annealed one week at 130 degrees F. the least. These expansions were very slow, being stationary from the beginning of the second day to about the fifth day (all of fillings from the annealed alloy), when it began again slowly and continued forty days.

The studies now presented seem to me sufficient for the beginning of a radical improvement in the production of dental alloys by manufacturers.—*Dental Cosmos, December, 1896.*

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TOXEMIA DURING COCAIN CATAPHORESIS. By Dr. Henry J. Moore, Frankfort, Germany. As many dentists seem to doubt the possibility of getting the toxic effects of cocain by the method of cataphoresis, it may be interesting to place on record a recent experience of mine. I had occasion, in the mouth of a

intervening reticulum of living matter? 4. Some have asserted that sensitive dentin was caused by an inflammatory condition set up by decay. Could this be true? 5. What influence does this inflammatory condition caused by decay have upon the dentin? 6. What causes the hypersensitiveness in buccal cavities of bicuspids and molars and labial cavities of the anterior teeth? 7. Is it the nearer proximity of the cavity to the pulp, or an inflammatory condition of decay increased by an extra amount of acid excreted from the inflamed gum? 8. What is your treatment of sensitive dentin? 9. What action do the medicaments known to the profession have upon the dentin? 10. May not the strong coagulants that are used by many have an injurious effect upon the pulp by being transmitted to it through the dental tubes? 11. Is there anything that can be safely used better than sharp instruments cutting lengthwise of the fibers—that is, cutting toward the coronal portion of the tooth? 12. May not sensitiveness of the dentin be greatly increased by cutting against the fibers toward the cervical portion of the tooth?

About fifty replies were received, which greatly exceeded my expectations. A few of them I will give in full. Dr. S. B. Brown, Fort Wayne, said: As regards question 3, I can give an opinion only from long observation which favors the affirmative, as indicated by sensation in projecting dentin suggesting indirect connection. Dentin is, so to speak, living bone, hard and soft tissue combined; the tubuli animal, the dentin mineral. Sensation attends vital structure (tissue), thus sensation in dentin is normal from vitality in the tubuli contents, varying in degree of sensitiveness by varied conditions. The dentin has varying proportions of the mineral elements; that containing the least is most subject to decay, and at all times most sensitive. This leads to the questionable statement by some that decay favors exalted sensitiveness when defective calcification is alone the cause. We know that decay is not a cause when we grind sound dentin for crowns, etc. The cause of increased sensitiveness in labial and buccal cavities is due to the fact that these cavities are generally located on the cervix where there is a constriction and condensation of tubuli—vitality, a greater per cent of life in a given area. I should judge question 10 could be answered in the affirmative from the numbers flooding the country.

Dr. Brown gave prescription of Dr. C. N. Pierce which he used with some advantage:

℞ Cocain.....gr v
Carbolic acid.....gr xx
Chloroform.....ʒss
Muriatic acid.....m. x
Alcohol.....ʒij

Also said great help came from manner of using instruments when forming cavities. Did not recognize much difference in the direction taken when excavating. It is unmerciful and unpardonable to use dull instruments or an engine that does not carry its points steadily.

Dr. Cravens, of Indianapolis: 1 and 2. It is a normal condition. It is due to incomplete calcification of the embryoplastic filaments projected from the odontoblasts; these possess the double property of conveying sensation similar to nerves, and are of course subject to irritation by external relations. The sensibility is normal, because when the pulp dies there is no longer sensation conveyed through dentin, and the embryoplastic matter existed from tissue of the sac.

3. I cannot say as to "direct" anastomoses. The dentinal fibers spring from and apparently return to the bodies of the odontoblasts, as disclosed by the microscope; the odontoblasts have nervous support from the system within the pulp. There are short connecting filaments between the odontoblasts that form a persistent reticulum, and doubtless prompt sympathetic or collateral activity of either function possessed by these remarkable bodies.

4 and 5. The idea that sensibility of dentin is due to decay is ridiculous; a tooth freshly broken is sensitive although there has been absolutely no decay. There may often be noted increased sensibility of dentin immediately underlying a tract of decay; but this is always in partially decayed tissue that has been deprived of its lime-salts, wholly or in part by action of the eroding agent of the decay. To be understood fully, let us start with a proposition that in living, healthy (normal) dentin there always is an equilibrium of constituents; any disturbance of this equilibrium results in abnormal conditions; disturbance of equilibrium of constituency may cause increased sensibility, diminished sensibility, or absolute loss of sensibility, without appreciably affecting the pulp of the tooth. This equilibrium of constituents is disturbed by inconstancy of the mineral elements only, which may be increased by imperfect nutrition resulting from protracted illness, or improper diet, or possibly starvation, because these elements are derived from external sources and

necessarily variable, while the organic or animal elements are persistent. Therefore, when under decay of the former class, for example, we find a leathery mass that in no respect resembles dentin, yet is exceedingly sensitive, far more so than solid healthy structure, we understand that it is the persistent animal constituent of dentin that has been deprived of its proper accompaniment of lime-salts. From such an example, and other points of observation of the phenomenal variableness of dentin sensibility, we draw the conclusion that with diminishing proportion of the salts of lime in dentin sensibility increases. On the contrary, in aged individuals who may retain their natural teeth we observe that there is a great reduction of sensibility, and even entire loss of it except very close to the pulp; that these are friable and retain metallic fillings with little satisfaction, showing a too great proportion of mineral elements. Therefore the second conclusion is that an increase of proportion of lime-salts, thus disturbing the equilibrium by hypernutrition, reduces the sensibility of dentin, and thus man is blessed with the insensible grinders of his declining years.

6 and 7. The notable sensitiveness in the buccal and labial regions is due to several conditions, partly structural and partly environal or regional; for instance, the tubuli of dentin are parallel for nearly their whole length, without being connected by anastomosing branches, in the regions of the cusps or incisive or occlusal parts, and when the enamel has been eroded or worn away so as to expose a section of such parallel tubes the irritability appears not to increase in direction of the pulp so much as laterally or across the tubes, nor yet so much as immediately under the enamel; in fact, the latter region seems to be the most sensitive of all, a condition that is attributed to the presence of the countless multiplicity of loops and anastomosing branches at that point. Another item relating to the buccal and labial regions is that they are nearly always protected from thermal changes by the enveloping mucous surface of the cheek or lips, and do not become accustomed to conditions of environment that the incisors are familiar with; for instance, air and fluids are generally tempered before they reach the buccal or labial faces of teeth. So also with respect to solid food.

8 and 9. I try to extract the moisture from the structure, and just in proportion as I succeed in desiccating tissue do I reduce sensibility therein. So far as I know, the medicaments sold to and used

by dentists for this purpose, so far as they are effective at all, operate by desiccation of tissue. I know nothing about hypodermics in this connection, although the quacks resort to them, with what success I cannot say. I have met with variable success with absolute alcohol, using a solution that contains 75 per cent menthol and 25 per cent phenol, either of which must be evaporated with warm air, and the teeth kept isolated from saliva. The absolute alcohol works the better, but should be preceded by commercial alcohol, as the absolute will otherwise cause pain—sometimes extreme pain. Cocain is totally ineffectual upon sensitive dentin. Measures for reducing sensibility are often not continued long enough to obtain good results. There is too much haste.

10. The current of transmission is from the center toward the periphera; besides, Dr. A. W. Harlan, of Chicago, an authority on therapeutical values, has declared emphatically (1895) that the coagulants are all self-limiting, and as their action is superficial the coagulum formed stops the agents almost at the point of contact; while they thus do no harm to the pulp, they do no good to the pulp or anything else. Coagulation is not antiseptization. 11. Sharp instruments are less dangerous than dull ones in skillful hands, and cause less pain.

12. This matter of manipulation rests with the operator, whether the preparation of a sensitive cavity shall be rendered bearable. It does not all consist in the direction cut by a sharp instrument, which only helps. It cannot be done painlessly by influence of drugs in local application, nor by desiccation. These are merely helps that enable a most excruciating operation to be performed with reasonably modified discomfort to the patient. Much may be accomplished by discreet impressions made upon the mind of the patient. The process, while a conversational one, is of a hypnotic character, but not profound nor of somnambulistic nature.

Dr. Guilford, of Philadelphia, says: Sensitivity of dentin is entirely normal, same as that of any vascular tissue. We have pulp, next to this the odontoblasts, and continuous with the latter probably dentinal fibrils going out to periphery of dentin. Dentinal tubes connect at various points along their length. Hypersensitiveness is of course abnormal, due to irritation caused by heat, cold, and foreign matter in cavity. In labial and buccal cavities we usually have the white or rapid decay in which only the lime-salts

are dissolved out by acid and the remaining vascular matter is thus left exposed and unprotected, hence its greater sensitiveness. It is not due to greater proximity to pulp. Sensitivity in cavities I treat with warm air and sometimes with obtundent composed of cocain, chloral hydrate, etc. Sensitivity on surface, due to erosion or abrasion, I treat with nitrate of silver, caustic potash, or chlorid of zinc, parts being first dried and protected with rubber-dam. One or more applications of either of the three usually gives relief. Do not consider coagulants dangerous except when applied too near pulp. Have not found much difference in direction of cut.

Dr. Abbott, of New York, says: 1. Inflammation. 2. Yes. 3. Sometimes "Tomes fibers" are direct branches from the nonmedullated nerve fibers of the pulp. In other cases are last in the reticulum of living matter of the medullary elements at the periphery of the pulp. 4. Yes. 5. The entire dentin of the affected tooth becomes hypersensitive, and in the neighborhood of the decalcified portion the canalicula are very much increased in size, and the amount of living matter is found to be much greater than normal. 6. The necks of teeth are endowed with a greater amount of living matter than any other portion of them, consequently are more sensitive. 7. Restore them, chemically, to their normal (alkaline) condition by use of the bi. carb. of soda. 8. Some escharotics (zinc chlorid and caustic potash) destroy the living matter to a limited depth in the carious and disorganized dentin. Others, such as cocain, aconite, cannabis indica, camphor, etc., and their combinations, are supposed to benumb or render the living matter insensible to pain. 9. No escharotics (coagulates) used in the teeth are far reaching enough in their action to injure the pulp of a tooth through any considerable thickness of dentin. 10. Yes. 11. I have never noticed any special difference in the sensitiveness of a tooth by cutting in any particular direction.

Dr. Andrews, Cambridge, says: In answer to first question I will reply to second question and say it is an abnormal condition, as dentin itself, in a perfectly healthy condition, should not be at all sensitive, according to authorities.

To third question I would answer that it is not known just how a connection is brought about. I myself have no doubt but that there is a connection in some way. Sections that are very thin show nerve fibers that are very fine. Dentin is a difficult substance to

demonstrate these fine fibers if there are any in it. I have seen fine nerve fibers from the pulp running between the odontoblasts as though they were to enter the dentinal canals, and that is as far as I have been able to trace them. Tomes mentions the remarkable specimen of Dr. Dentz, of Utrecht: "These, which were cut from embryo while about half the thickness of the dentin was formed, show pear-shaped bodies arranged with regularity a short distance within the border of the dentin, the smaller end being directed toward the pulp and being at their small end connected with one or more dentinal tubes. These pear-shaped bodies have two or three large nuclei, and present a close resemblance to some forms of nerve-end organs." In regard to a reticulum of living matter, the only living matter is from the fibers or their branches, Heitzmann's reticulum being only a fibrous connective tissue, scaffolding, which is calcified with the matrix.

4. I should say the sensation was caused by irritation and not by true inflammation. We cannot have true inflammation in tissue like dentin. This irritation is undoubtedly caused by foreign substances, the action of acids, etc. 5. I do not believe there is any true inflammatory condition. The irritated or sensitive condition caused locally by decay may make the whole tooth more or less sensitive. 6. The exposures of the fine terminating ends of the dentinal fibers to irritants, acids, etc. 7. Outside irritants, acting on the most sensitive portions of the tooth, may be acids or anything else. 8. I get the cavity dry, use sharp instruments, cutting with the direction of the fibers with a quick, sharp stroke. 9. I cannot answer fully; undoubtedly some of them are injurious. 10. I should say some of the coagulants, such as chlorid of zinc, might have an injurious action on the pericemental tissue. 11. Sometimes I find cocain and glycerin mixed to a paste to be very good. 12. I would say yes, decidedly so, although any cutting in that zone of softened tissue caused by the acids given off by organisms will act on all the fibrillæ imprisoned in the softened mass, whatever way you cut. The irritation of diseases of the sockets, pyorrhea, may be transmitted to the whole substance of the dentin, causing an irritated and sensitive condition. In fact, any trouble of a sensitive and painful nature may be transmitted to the teeth. I believe the sensitive condition of the teeth is more often caused by a diseased state of the general condition than is ordinarily supposed,

the teeth sharing their part of this abnormal condition with all the other organs of the body.

Dr. W. C. Barrett, Buffalo, says: 1. An irritated condition of the protoplasmic elements of the dentinal fibrillæ. 2. Necessarily, yes. 3. It is not a direct anastomosis or continuous condition. 4. In a modified degree. Protoplasm does not take upon itself the usual inflammatory conditions of fully organized tissue, but its condition is materially modified. 5. It is at the junction of the enamel and dentin and the cementum and dentin; and the sensitive places are often at the location of the so-called interglobular spaces, where there is an excess of living matter. The proximity of the pulp also increases the irritation due to thermal changes especially, and the whole may be influenced by a degenerated condition of the mucous follicles, which exist in great numbers at the cervical portion of the mucous membrane. 8. The conductive power of the dentinal fibrillæ may be suspended by paralyzation. This may be accomplished by coagulation, partial or complete, by desiccation or by refrigeration. Certain remedies also have the power of modifying their conductive or their receptive power. I depend mainly upon desiccation, and combine with this modifying sedatives. I also use prophylactics given internally. There are a great many remedies which act at times and in certain cases upon dentin. It is impossible to set them down here, because to make their use intelligible some statement must be made of the condition in which each is applicable. Probably in connection with warm air I use the essential oils more than any other one thing. 10. Undoubtedly, yes. 11. Nothing better, but other things may be used in connection with good results. 12. It may be increased by any rough treatment.

Dr. E. T. Darby, Philadelphia, says: 1, 2 and 3. I think it a perfectly normal condition. All real tissues with rich nerve supply are sensitive. The fibrillæ undoubtedly have an intimate relationship with the pulp, and any injury to the fibrils is conveyed to the pulp. Healthy dentin is sensitive, but not to the same extent as diseased dentin (decayed dentin). 4 and 5. I don't believe in the theory of inflammation in the dentin. We cannot have inflammation without blood vessels, and there are no blood vessels in the dentin. The fibrils in the dentin are nerve fibrils and are a prolongation of the odontoblastic cells upon the surface of the pulp. 6. I have always looked upon the hypersensitiveness of the dentin as dependent upon

the amount of acid present in the decayed structure. This hypersensitiveness may be diminished almost instantly by putting in the cavity of decay a little bicarbonate of soda before beginning to excavate. Cavities along the labial and buccal surfaces are often more sensitive because they are bathed in an acid mucus from the gingivæ. It is always well to apply a little bicarbonate of soda before beginning to cut these, especially if the rubber-dam be not first applied. 7. I don't think the nearness or distance from the pulp has anything to do with the excessive sensibility. 8. My treatment for sensitive dentin is the following: First, apply rubber-dam; pack into cavity for a moment bicarbonate of soda; wipe the cavity with absolute alcohol; dry thoroughly with warm air (not hot air); then put into the cavity for a few moments "Robinson's remedy" (equal parts carbolic acid and caustic potash); dry the cavity again and go ahead with sharp excavators. When I have done this I have very little complaint on the part of my patients. 12. I don't think cutting from the pulp instead of toward it has anything whatever to do with the promotion or abuse of pain in excavating. Somebody made such an assertion years ago and it has been handed along from one practitioner to another without question. There is no physiological reason why it should be true, and my experience and observation convinces me that there is nothing in it but theory.

If time permitted I would like to give several more of these letters.

It will be noticed all but three give sensitive dentin as a normal condition. Drs. Andrews, Abbott and Barrett say it is an abnormal condition. While I am not prepared to state from a scientific standpoint, I believe that all disease is caused primarily by an irritant. Histology and microscopy do not demonstrate that there is an actual connection between the odontoblastic fibrils in the tubules of the dentin and the nerve fibers of the pulp, therefore the assumption would be that there is none. From an operator's standpoint one would assume that there is some connection. I have found very sensitive dentin when trimming a perfectly sound tooth. What this sensation is I do not know; probably irritation and contraction of the dentinal fibers; neither do I know what the connection is between the dentinal fibers and the nerve fibers of the pulp, but that there is some connection I am sure.

Dr. Bodecker says: "Since we know that nonmedullated nerve fibers have the same structure as the dentinal fibers, we must con-

clude that both the nerves and dentinal fibers are made up of living or contractile matter, the contraction of which is facilitated by the presence of vacuoles. For according to modern researches the conduction of sensation centripetally and of motion centrifugally is very probably instituted by the contraction of the living matter."

He also states that at the periphery of the dentin (the interzonal layer) is the beaded appearance of the dentinal fibers, lacking vacuoles in this situation. The fibers are bifurcating, as is well known, and becoming more and more delicate correspondingly exhibit more and more beads.

The reticulum into which the lateral conical offshoots of the dentinal fibers inosculate is extremely dense—much more so than in the rest of the dentin. The densely reticulated zones usually correspond to the depth of the bifurcation of the dentinal fibers. The presence of this dense reticulum of living matter evidently explains the fact that the interzonal layer between enamel and dentin is so extremely sensitive.

Sensation may be greatly increased by the presence of acids in cavities of decay, especially in certain classes.

In buccal cavities of the molars and bicuspids and labial cavities near the gum in the anterior teeth we find greater sensitiveness, being caused in part by there being a greater amount of living matter. This is proven pretty conclusively by Dr. Black in his experiments, published in the *Dental Cosmos*, 1895, where he says: "This revealed the fact that the dentin of the crown of a tooth is generally heavier in proportion to its bulk, is more dense than the dentin of the root," weight gradually diminishing from crown to apex.

To my mind the hypersensitiveness of these cavities is mainly caused by an acid excreted from the gum, usually inflamed, keeping the cavities continually bathed with it, destroying or breaking down the mineral constituents of the dentin, and leaving an extra amount of irritated living matter. Any alkaline substance in or taken into the mouth is kept from these cavities by the close contact of the cheek and lip.

The treatment of sensitive dentin has been much and varied, also medicaments used are many and varied. None of the ways of treatment or medicaments used seem to be satisfactory in all cases. Treatment may be systemic or local, or both. Locally it would be either to paralyze the living matter of the dentinal tubuli, which can

be done with such medicaments as the anesthetics, like chloroform, ether, alcohol, cocain, the essential oils, and electricity, or destroy it by the use of such medicines as the coagulants, like carbolic acid, caustic potash, chlorid of zinc, etc. The coagulants are self-limiting, as has been well proven by Dr. Harlan and others, consequently they coagulate but a slight depth and are harmless.

My own treatment is to apply rubber-dam, pack the cavity with bicarbonate of soda for a minute or two, wash out with alcohol and evaporate with warm air, not hot, using the warm air until dentin is dry. If this does not put the dentin in condition to be worked with sharp instruments without much pain, I place in cavity a pellet of cotton dipped in Dr. Black's 1, 2, 3 mixture, or some of the essential oils, tannin and glycerin paste, cocain and glycerin paste, or Robinson's remedy, as the case may be, drying out with warm air. This treatment in a majority of cases works very nicely. In mouths known to be strongly acid, or where there are labial or buccal cavities, I have the patient use milk of magnesia as a wash for a few days before the operation. With extremely nervous patients bromid of potassium in 10 or 15-grain doses, three times a day for three or four days, will in many cases work like a charm. I prefer bromid of potassium to morphin and the coal tar derivatives, although they often benefit greatly.—*Dental Review, February, 1897.*

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PECULIAR PATHOLOGICAL PERCEPTIONS. By J. D. Patterson, D.D.S., Kansas City, Mo. Read at Anniversary Meeting of Chicago Dental Society, February 1, 1897. The particular peculiar pathological perception to which I wish to direct your attention in this paper is the claim which has in recent years been put forth by certain pathologists belonging to our profession, and which may be briefly stated as follows: That "the inflammatory stage of true pyorrhea alveolaris primarily begins in tissues on the side of the root near the apical extremity, and secondarily advances in the very large majority of cases toward the gingival borders," and that "the cause of this inflammation or pericementitis is the plastic exudation from the blood-vessels freighted with salts, which in their deposition and crystallization upon the cementum of the root exert the influence of foreign bodies and act as irritants." "That the chemical nature of these salts indicates a condition of the blood in which there is an excess of uratic salts and uric acid." This

is known as the uric acid or gouty diathesis, which is prevalent in gout and rheumatism, and the pathologists referred to ascribe this condition as the cause of the diseases commonly known as Riggs' disease, pyorrhea alveolaris, phagadenic pericementitis, alveolitis, etc., etc.

In discussing this subject your attention is directed to a well-known fact which is stated in text-books upon the practice of medicine, which is as follows—I quote from the latest edition of Flint's Practice of Medicine: "It has often been too much the custom to consider all affection in persons subject to gout as of a gouty character, and the gouty diathesis is often considered to exist upon insufficient data." For many years pathologists in the medical profession have persistently saddled upon a gouty diathesis nearly every trouble known to be the result of perverted nutrition, and a few men in the dental profession, not to be outdone in the fascinating pastime of speculative etiology and pathology, have saddled upon the well-worn hack of a "gouty diathesis" nearly all of the ills which manifest themselves in the oral mucous membrane, and in the investment of the roots of teeth. The study of perverted nutrition has seemed to cause perverted perception, and as an easy road out of the dilemma they have followed in the wake of their medical brethren by giving a gouty diathesis credit for all oral diseases where, in their minds, diagnosis seemed to be doubtful.

Some years ago the writer was one of a class in the study of physics. For several lessons the subject was that of "gravitation," until all were supposed to perfectly comprehend the law upon that point. At a "quiz" shortly after one of the class was asked by the teacher why a kite rises in the air? He promptly responded: "On account of gravitation!" It seems to me that some of our brethren have adopted an apparently easy explanation of the etiology and pathology of pyorrhea alveolaris, and everything is laid to gout for the reason that their minds are full of it, just as was the student's upon the subject of gravitation. Although three years have scarcely elapsed since these theories were first exploited by Drs. Marshall, Pierce, Burchard, Kirk, *et al.*, yet the writer has been confronted lately by statements of patients who came from unknown operators, claiming that they had been told that the disease of the gums from which they suffered was occasioned by gout, thus conveying the impression that local treatment would be unavailable, and that

nothing could be done (I might add parenthetically that nothing was done except to send such patients to a physician), yet the cases were and have proved perfectly amenable to local treatment.

Ever since the advent of a better understanding of pathological conditions—largely brought about by Virchow and the well-known cellular theory—the elucidation of abnormal human complaints has gone along the lines of reason and science. The old "humoral pathology" has given place to a reasonable pathology which traces from cause to effect and from effect to cause in logical sequences, but it seems to the writer that at times this reasonable way has perhaps been forgotten.

It shall not be our attempt to deny the morbid and predisposing influence of the gouty and rheumatic diathesis in the progress of pyorrhea, but to point out that it is not the exciting local cause on account of deposits upon the apical portion of the roots of teeth, and that these deposits do not precede the disease. That pyorrhea is not *per se* "a local manifestation of a constitutional condition."

Even in gout authorities differ as to whether the deposit precedes or is a result of inflammation from impaired conditions of nutrition and consequent abnormal conditions of the blood. Ebstein, an authority on gout, in Flint's Practice of Medicine is quoted as saying that "The tissues which are the seat of urate deposits are in the condition of coagulation necrosis," and that this necrosis precedes the deposition of urates and is caused by the abnormal condition of the blood. He also says: "An area of inflammation exists around the focia of coagulation necrosis."

Dr. Burchard, in *Cosmos* (April, 1894) strangely quotes from Ebstein in support of the claim that inflammation follows instead of precedes the deposit, when Ebstein clearly states his belief to the contrary. In the article by Dr. Burchard just referred to, Ebstein is quoted as follows: That "gout is a nutritive disturbance, first leading to necrosis, and this followed by a deposit of urates in the necrotic area."

Garrod, another authority upon gout, says: "A single attack suffices to cause a certain amount of the urate deposit in the affected joint." These writers who have long been authority upon the subject of the uric acid diathesis and its manifestations should surely justify the belief that in pyorrhea, even if the result of a gouty diathesis, the deposits are secondary.

The statements of writers in regard to the deposits having been found upon the apical portions of the roots of teeth without any precedent lesion, have no doubt been made with all candor and with a desire to arrive at a scientific explanation, but this testimony, it is acknowledged, is difficult to secure. The celebrated "lateral incisor," in possession of Dr. Kirk, "upon which the pericementum had been destroyed from the apex to one-half way to the enamel border, the remaining portion apparently intact, certainly so at the gum margin," and upon which at a point one-fourth of an inch from the apex was found a deposit, and other positive, but so far as we are informed, somewhat dogmatic statements of serumal deposits having been observed without preceding lesion either in the gum tissue, or pericemental disturbance from pulp abnormality, or traumatic pericemental injury, is scarcely scientific proof, when upon the other hand scores of operators having had hundreds of cases of pyorrhea in all stages testify that solution of the gum margin and absorption of investing processes have in every case been found where the serumal deposit appeared.

I have myself observed cases where the deposits were present without "apparent" loosening of the gum, but upon closer investigation have concluded that at one time there had been suspicion of gum inflammation, which had passed away in removal of the irritant and the gum had probably reattached. The exceptions were in cases where pulp irritation, or pulp calcification, had created a necrotic condition around where the deposit was observed, the gum at the gingival margin being entirely undisturbed.

I desire now to direct your attention to another point, viz., authorities, as a rule, agree that the uric acid deposits are found in territory where the blood supply is meager and the tissue nonvascular. Now, the peridental membrane is very vascular, and reasoning from accepted authority, the urates would not be deposited in the vascular tissue of a root's investment, but in territory where "coagulation necrosis" would be likely.

C. S. Tomes says: "The alveola dental periosteum is richly supplied with nerves and blood-vessels."

Dr. G. V. Black says: "The blood supply of the peridental membrane is very bountiful in the young, and, although diminished as age increases, the vessels remain abundant."

It follows that until the normal nutrition of these parts has been

destroyed by a precedent irritation the deposit of urates would not be likely to occur. In vascular tissues the blood forcing nutrition into the tissue ought to effectually prevent a stoppage or coagulation, which is necessary to the formation of deposits. We therefore should expect to see the vascular investment of a tooth free from such accretions.

I will now direct your attention to the anatomical relation of the parts. They do not afford the opportunity for the depositions which are found in the classic seats for gouty deposits, viz., the articular ligaments, tendons and sheaths, bursal sacs, the kidneys, the skin, the external ear, lungs, intestines, etc., etc. In all these positions, where it is acknowledged gouty deposits may be found, not one but what presents, even to the naked eye, a convenient place for the reception of abnormal urates, but when we examine the dense tissue about the root of a tooth we cannot but wonder what a peculiar conception it is that concludes that in normal relation of these bones there can be precipitated from the rapidly flowing blood current calcic material upon the cementum of a root.

I now show you a green lower maxilla, upon the right side. I have cut through bone and root of the second bicuspid about two-thirds way from the normal gum margin to the apex, in order to give an object lesson to those who are so long from the dissecting-room that they may have forgotten the absolute density of these related parts. Without a powerful glass no space can be seen between cementum and pericementum. Can you believe that uratic salts are here deposited? I cannot; there is no space for such deposits. In these "peculiar conceptions" under consideration there runs through the arguments brought out in support of the theories a convenient bypath in which refuge is taken. This is found in the expression "true pyorrhea." Driven into close quarters they escape by saying, "Ah! your cases were simply inflammation from salivary calculus or other local irritation, and not true pyorrhea at all!" In other words, any pyorrhea where the uric acid diathesis is not found, and the disease is not destructive and stubborn, is not their beloved pyorrhea at all, but simply a common vulgar case of local trouble consequent upon some irritation to the gingival margin of the gum.

This practice of designating the different stages of the same disease as a difference *per se* is exasperating. It is acknowledged even

by the supporters of the uric acid theory in pyorrhea that local symptoms are nearly identical, whether the disease is entirely local or constitutional, and it is beyond our comprehension why it is not still pyorrhea alveolaris, even if the causes are complex or simple, when the symptoms and results become identical.

As well might we say that other affections of the mucous membrane, such as catarrh or diphtheria, in their different stages, should receive a new name, as "true" catarrh or "true" diphtheria, if aggravated by complex local or systemic predispositions.

The principal points I have endeavored to make clear may be summed up as follows: 1st. That in gout, authorities differ as to whether the deposits follow or precede the inflammatory action. 2d. That vascular tissues, such as the pericemental membrane, are not subject to the gouty deposits. 3d. That the dense anatomical structure of the parts about the root of a tooth do not exhibit the necessary bursa or the necessary character of tissue in which gouty deposits appear, unless precedent lesion has caused such space.

These conclusions, if true, all strongly argue against what I have called the "peculiar pathological conceptions" of Dr. Pierce and others upon the subject of pyorrhea alveolaris and the gouty diathesis.—*Dental Review, February, 1897.*

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GERMAN GOVERNMENT AND INDIVIDUAL HEALTH.—If national health is national wealth, then individual wealth is the politically important unit of measure. This is emphasized in an interesting way in the introduction of a "Handbook on Health" just issued from the imperial department of health of the German government. It says: "The health of man is a precious possession. Its loss causes harm not only to the individual but also to the community. The individual whose health is impaired suffers discomfort or pain, or both. He loses his ability to work or to earn an honest livelihood, which eliminates all enjoyment and pleasure of life. He must incur expense before he can regain his original health, and anxiety and poverty are usually the result both to himself and family. By the decrease of his and their productive labors, and their consumption as well, the community suffers loss in its industrial progress and brings about an expense in the support of the poverty-stricken home; and when, as it not infrequently happens, the sick man is suffering from some infectious disease he

becomes a danger to his neighbors and may be the cause of a national epidemic or danger."

The extent of the loss arising from the disturbance of health can be estimated from the returns of the Workingman's Sick Clubs of Germany. In 1891, out of a total membership of 6,500,000, more than 2,000,000 cases of illness were reported, each of which averaged seventeen days in duration. These clubs expended for medical aid $22,000,000. Now it may be assumed that among the remaining 44,000,000 Germans, 24,000,000 of whom are old enough to work, the cases of illness were equally numerous and as long continued; the expense caused by sickness in Germany in 1891 will not be placed too high at $120,000,000. The loss incurred by stoppage of wages is not included in the above figure. The preservation of health and promotion of happiness is the aim of this governmental department. Among the tasks which it proposes are "prevention and limitation" of sickness and the "preservation and prolongation" of the ability to work, and of man's life in general.—Translated by Dr. B. J. Cigrand, from *Journal Der Heilkunde, January, 1897.*

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MORTALITY AND ANESTHETICS. By Dr. Gustav Preiswerk, of Basel. Concerning the dangers accompanying the administration of general anesthetics the following table well shows; it is taken from the publication of the recent Congress of the German Society of Surgeons, held at Berlin:

With chloroform	1 death in 2614 administrations.
With ether	1 death in 8431 administrations.
With chlorf. and ether	1 death in 2891 administrations.
With ether and alcohol	0 death in 1381 administrations.
With bromoethyl	0 death in 2151 administrations.
With pental	1 death in 219 administrations.

The statistics relative to the latter three are very meager and an exact proportion can not be given. The greater number of cases in the above report came from dental records and have been incorporated in the statistics of general surgery.

Local anesthetics received some attention and the anodyne which attracted some consideration was the active principle of tobacco—nicotin. The use of the cigar seems to have originated in America, since we are informed that Columbus observed cigar-smoking Indians. The Chinese, according to ancient drawings, must have known the

use of tobacco, as the pipe was a known instrument employed in smoking. As with all narcotic agencies, tobacco found many votaries, and suffered through edicts and legislation. Among the latter we find Pope Urban VIII's bull prohibiting the use of tobacco; and later, in 1634, the Russians were forbidden its use under penalty of losing the nose, and in some cases even life. In Switzerland a heavy fine and penalty were exacted from all who indulged in the habit of smoking. Yet nothing seemed able to limit its use and gradually it has found its way to all parts of the earth. Not only do men resort to it as a smoke-narcotic, but its sleep-producing effects are gotten from both snuffing and chewing. Tobacco is the first agency of enjoyment which is of real interest to the dental profession. The smoke of tobacco deadens and perfectly destroys all germs which may be present in all fungus growths, and exerts an antiseptic influence on various lower forms of life, especially the boletus. Redner observed that people who smoked tobacco or used it in any form possessed better teeth than those who did not use the weed. Further study along this line may disclose to us that nicotin, although recognized as a poison, may under some form be beneficial in dental science.—Translated by Dr. B. J. Cigrand, from *Schweizerische Vierteljahrsschrift fuer Zahnheilkunde, January, 1897.*

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VULCANITE VS. GOLD-CLASPS. By Dr. C. Jung, of the Heidelberg University. The fact that vulcanite clasps are productive of ring-like caries has attracted attention as to the real cause of this disturbance, and the further determination of why like injurious results do not come from the use of metallic clasps. There is to some extent caries resulting from gold-clasps, but it is not of so destructive a character. The decay does not begin so early, nor is it so intense, and the disturbance is more of a mechanical than of a chemical nature.

The exact cause for this difference in caries coming from both vulcanite and metallic clasps has not as yet been fully explained. In the past it has been contended that in the employment of metallic clasps there is ever a small space between the clasp and the natural tooth, no matter how carefully the clasp has been produced, and in consequence there is formed a favorable place for lodgment and dislodgment of food—acting as self-cleansing; while with the tight-fitting vulcanite clasp the food once in the minute interspace, all

conditions are favorable for disintegration and fermentation. And further, the food is less likely to stick to the smooth surface of the gold clasp than to the rough and porous sides of a vulcanite clamp.

Both of the foregoing theories must be discarded as not fully answering the query, since the difference between a correctly fitting metallic clasp and a carefully constructed vulcanite one is so very slight as not to seriously enter into the problem; and further, the rapid decay is not avoided when the contact surface of the vulcanite clasp is perfectly smooth and polished, so that we must seek further if we hope to arrive at the truth.

That the metals, and especially the royal metals, antagonize the workings of the lower forms of life, and that they materially limit their growth, are facts well established, yet the real cause of this circumscribing influence of silver, etc., has not yet been clearly demonstrated. But it appears that a metallic salt of antiseptic powers is the direct result of the culture media, and that this salt resulting from the presence of lactic acid is self-limiting to the bacterial product, and hence restricting to the activity of the bacteria.

The most recent investigations of the eminent Dr. Crede, of Dresden, demonstrate that some of the lower forms of life under certain conditions produce acid products which, when brought in contact with silver or gold, are sufficiently strong to affect the metal and produce a metallic salt. If these deductions are correct, and we have no reason to doubt them, then we in a measure begin to understand why metallic clasps produce less harm than the vulcanite ones. In the future we will place a thin strip of gold on the contact surface of the rubber, and so produce a vulcanite clasp with a metallic lining. I have suggested this as an article intended to awaken investigation in this direction, and if it accomplishes this the purpose has been fulfilled.—Translated by Dr. B. J. Cigrand, from *Journal fuer Zahnheilkunde, January, 1897.*

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FARADIMETER IN DENTAL PRACTICE. Of late considerable attention has been given to Dr. Edelman's recent innovation—the faradimeter—with which he registers "neural-endurance." Numerous tests are being made to ascertain the relative power of endurance between men and women, and the most interesting experiments with this new instrument come from Dr. Ottolenghi, who discloses what may seem incredible data. He asserts that

women are less sensitive to pain than men, and that this sensitiveness is less in early years than later in life; that sensitiveness increases to the twenty-fourth year and decreases after that period. His facts he has gathered from close study of 682 women, and he is certain that the power to endure suffering varies according to age. Endurance of pain has a much broader limit in women than men, reaching a maximum far beyond the masculine limit, and he ascribes this to the "greater suggestibility" of the female sex. General sensibility reaches the highest point at about the age of 19. He concludes that sensitiveness to pain is in close relation to the "psyche," while general sensibility depends on the peripheral nerves. He further states that he considers woman's insensibility to pain as a true sign of her inferiority to man, since the uncivilized and the degenerates are found to be insensible to pain. He attempts to prove a connection between this latter characteristic and the longevity of woman.—Translated by Dr. B. J. Cigrand, from *Centralblatt f. Nev. u. Psychologei, 1897.*

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BLEACHING TEETH BY MEANS OF SODIUM PEROXID APPLIED CATAPHORICALLY. By Henry Barnes, M.D., Cleveland, Ohio. Clinic before Ohio State Society. The case presenting was a right superior central incisor badly discolored. The root-canal had been filled about two-thirds of its length. The process of bleaching was carried on as follows: A quantity of sodium peroxid, in powdered form, was placed within the pulp-cavity and the unfilled portion of the root-canal. The positive electrode was then applied and the contents of the cavity moistened with water. In this case the voltage was carried as high as eighty, indicated on the dial, and the current was continued for from ten to fifteen minutes altogether. The cavity was next filled with a 10 per cent solution of hydrochloric acid, to neutralize the sodium peroxid; then rinsed with bicarbonate of soda solution to neutralize the acid. The cavity was then lined with paraffined white wax and filled with cement. Result very satisfactory.—*Ohio Dental Journal, Feb. '97.*

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ELECTRO-PLATING OF CROWN AND BRIDGE WORK. By W. H. Hayden, D.D.S., Youngstown, O. Among the various applications of electricity to the practice of dentistry, I consider as not the least in value the electro-plating of crown and bridge work

with pure gold. In the use of coin gold it is quite impossible to get the old or yellow coins and those of more recent coinage have that objectionable reddish color which will oxidize in almost all mouths. Even the ordinary 22k. plate will discolor in many mouths, but pure gold in very few.

To a pint of distilled water add 30 grains of photographer's chlorid of gold and about 60 grains cyanid of potassium. When plating suspend in solution from positive wire a plate of pure gold, at least double the size of article to be plated, and from the negative wire the finished crown or bridge. Turn on current from a half minute to one minute and remove crown and rub it with bicarbonate of soda. Repeat the operation until the desired result is obtained; usually two or three times suffice.

It is my plan to leave the crown in this condition instead of burnishing, as having a dull rather than burnished surface, it is far less conspicuous in the mouth. Such plating on surfaces not exposed to wear in mastication will wear indefinitely, and wear from mastication will in itself keep it bright.

I use the current from the 110-volt Edison current with a resistance of two 50-volt 16 C. P. lamps in series, which gives me about one ampere. I also have a 10-cell storage battery for cataphoric use giving 20 volts which does the same work, using a 20-volt 6 C. P. lamp as resistance. Those having cataphoric appliances using dry cells can readily adapt that current by using the proper resistance. *Ohio Dental Journal, February, 1897.*

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NITRATE OF SILVER IN ROOT-CANALS. By Charles D. Cheney, Hoboken, N. J. I have been experimenting (if a steady reliance may be so designated) with silver nitrate for over two years. I have used it in root-canals during about that period, and have come to believe that in it we have as near an ideal as we are likely to get. I have not, before the publication in your November issue, seen or heard silver nitrate suggested for root-canal treatment; it was, however, but a short step for me from the use of it in an ordinary cavity of decay to use in the canals. I have used it with satisfaction in ordinary cavities for a number of years, and during the period of *canal* use my satisfaction has been infinitely increased.

I may say I consider pulp-extirpation and canal-filling more scientific than any method of so-called pulp-"capping," especially

since silver nitrate makes the former operation practically successful and certain. I have never seen any objectionable effects from its use in pulp-canals, or I believe I may say *any* "effects." The use of the nitrate when the pulp is but thinly protected by dentin is not to be tolerated, but I have not observed any irritation to the pericementum when the canal may have been large and the walls thin.

An important improvement which I very early discovered and have used exclusively since was the substitution of an alcoholic saturated solution of silver nitrate for the customary aqueous solution. This is an improvement which I consider essential to thorough success. Alcohol dissolves less of the nitrate, but the rapid evaporation compensates and makes a less quantity equally efficacious; the alcohol also penetrates farther and quicker than water; a warm air blast or even a few moments' delay, and the natural body heat gets rid of the solvent and also any small degree of moisture which may be present, thus leaving a deposit of microscopic nitrate crystals to continue the effect very slowly as the natural moisture returns to the immediate vicinity. Rather strange, it seems, but there appears to be within the canals none of the usual discoloration of silver nitrate, except in the presence of organic decomposition, when the precipitation of black oxid or sulphid is instantaneous. Decayed dentin is not so affected, though it often becomes slightly yellowed.

The silver nitrate seems to take such thorough care of affairs within the canal that it would seem less important what filling is used, provided it be non-absorbent and unchangeable. I have good success with gutta-percha, avoiding most religiously, however, all that which has any considerable "toughness"—a quality which is incompatible with its successful use in any way.

The painting of the surrounding gum with strong tincture of iodin, immediately after the filling, contributes in a large degree towards success and the comfort of the tooth, as I believe. Occasionally the slight soreness due to the operation may persist over twenty-four hours, in which case I repeat the application of iodin or advise capsicum plasters, according to circumstances.—*International Dental Journal, February, 1897.*

CHLORID-OF-ETHYL SPRAY directed into the alveolar cavity stopped severe hemorrhage after tooth extraction. The cavity was then filled with cotton wet with tincture of hamamelis.—*Gaz. Med. de Liege.*

Letters.

CORRECTION BY DR. BOICE.

PHILADELPHIA, March 7, 1897.

To the Editor of the Dental Digest,

DEAR EDITOR:—I see in your February number you make the following statement: "We are glad to welcome to our ranks *The Stomatologist*, a new and bright monthly journal published by the Alumni Association of the Philadelphia Dental College."

The Alumni Association of the P. D. College has no connection in any way with said publication. A copy of *The Stomatologist* was handed to me to-day, and on its front cover it states—"Published by Leo Greenbaum, in the interest of the Alumni of the Philadelphia Dental College." The truth of this statement might be questioned. Yours truly, ALONZO BOICE,

President of Alumni Association of Philadelphia Dental College.

RECENT IMPROVEMENTS IN FILLING TEETH.

CHICAGO, March 5, 1897.

To the Editor of the Dental Digest,

DEAR DOCTOR:—Your editorial under the above title in the February issue of the DIGEST, directing attention to Dr. Black's paper before the recent meeting of the Chicago Dental Society, would seem to call for some comment at this time. Considerable emphasis has in the past few years been given to the necessity of practicing extension for prevention in the preparation of cavities, and now that the profession are in a fair way to profit by a judicious observance of this principle it would seem ill-advised to have editorial influence directed to bring it into discredit.

Some of the statements in the editorial were evidently made for the purpose of calling out discussion, but I fear that many of those who read it may not readily see between the lines, and are therefore likely to accept the teaching as in accord with your personal convictions. This latter surely cannot be the case, for a practitioner of your experience must be aware that to practice along the lines indicated, viz., "After removing the decayed portions, to cut away only so much of the tooth substance as would allow us to anchor the filling properly," is to invite oft-recurring failure. One of your reasons

cavity. This weakens the remaining walls to such an extent that fracture is almost inevitable, the fracture usually extending above the gum margin and involving more or less of the root. To prevent this accident, and to obviate the difficulty of treating the anterior canal, Dr. Marshall advocated cutting off the crown at once. This renders the canals perfectly accessible, and with a perfectly adjusted crown the tooth is permanently serviceable.

Dr. William Conrad had been invited to open the discussion, but another important engagement preventing his attendance he sent his remarks in writing. He did not agree with Dr. Marshall that this practice was advisable or even allow that it was excusable; that to cut off the crown of a tooth in order to gain access to any root-canal was bad practice; that it was simply a question of skill, and skill could never be gained by avoiding hard work. He thought that Dr. Marshall overestimated the tendency of these teeth to fracture, and that the percentage of them that do break down is too small to warrant such heroic treatment of the entire class, and furthermore, that as the difficulty of root-canal treatment and the liability to fracture are not confined to any one class of teeth, the better practice is conservative.

Dr. Bartlett opens from the anterior surface, considering this better practice than cutting through the grinding surface to gain access to anterior canal. He has never considered these cases so troublesome as the superior molar with the anterior buccal canal.

Dr. Fletcher took issue with both Drs. Marshall and Conrad on some points. The large majority of these cases he built up with amalgam after filling the pulp-chamber with oxyphosphate, and these teeth so treated lasted from five to fifteen years, and a split tooth was the exception. His advice was to cut away tooth to good margin, build up with amalgam and then crown when the tooth breaks down. You have then lengthened the life of the tooth just the length of time the amalgam filling lasts. Another point is this—be the man ever so skillful, he will never get the articulation that nature provides. When the dentist cuts off a crown he will rarely get as good an articulation with his artificial crown as that destroyed. With reference to breaking broaches or drills in the canals that are difficult of access, he has had little trouble since following Dr. Cushing's rule, which is simply—never try to twist a broach that binds in the canal. Clean out canal, avoid twisting or

given for cutting so little proves fallacious if reasoned to its logical conclusion. Which is the surest economy to the patient—to have teeth filled in such a way that eventual failure is almost certain to occur, or to have them filled by the method which you admit "will prevent recurrence of decay of the proximal surfaces more surely than any other," even though a larger fee is paid for the latter operation? Good dentistry is the cheapest dentistry in the end, and you and I and all other earnest practitioners should strive to impress this upon our patients.

Your estimate of the length of time necessary for the insertion of these large contour fillings is altogether too high. No competent operator need consume from "four to six hours" to put in the largest contour filling, to say nothing of the average one of everyday practice. Modern methods and appliances have shortened up these operations, till to-day they are less formidable by half than they formerly were. Not only that, but the work is being done more perfectly than it ever has been.

No, your kind of teaching will not do. There are enough temptations to make the average practitioner fall short of an adequate thoroughness in his work, without the editorial dictum that something less thorough than the most thorough is the proper line of procedure. We cannot always—I sometimes think we cannot often—reach the ideal in our work, but the sooner we recognize the ideal and the more earnestly we strive to attain it, the better it will be for us and our patients. Fraternally yours,

C. N. JOHNSON.

ST. LOUIS LETTER.

ST. LOUIS, March 18, 1897.

To the Editor of the Digest,

DEAR DOCTOR:—At the regular meeting of the St. Louis Dental Society, held March 2, Dr. M. C. Marshall presented a paper setting forth his practice in regard to the first inferior molar, distal cavity, pulpless. He recognized the fact that it is very difficult to treat and perfectly fill the anterior root through the distal cavity, and that too frequently a portion of broach or drill is left in the canal, and our patient is dismissed with an uncertain feeling on the part of the dentist. And again, in order to gain access to the anterior canal at all, it is customary to cut through the grinding surface from the distal

as that which has existed, we can often obtain a much better one, so that this should not deter us from making a crown. In conclusion, he said that he expected opposition; all new ideas meet with opposition, and he was still of the opinion that not all molars but the majority last better and serve better crowned than filled.

The rest of the evening was devoted to a discussion of the Chicago Dental Society Clinic. Only four of the members who had attended the clinic were present at this meeting, but many of the clinics were described, and a most interesting and enthusiastic report given by each one.

Dr. Taggart's artistic porcelain work attracted more general attention perhaps than any other one clinic. But each one brought home some thought of special value to himself and all wished that the "clinic" might become an annual meeting in some central city, if it could be as well arranged and delightfully carried out as it had been in Chicago.

Of course the St. Louis dentists cannot expect to be honored in every city by having such graphic illustrations of their methods of practice published in the daily papers, but we would not look for such flattering notice except from our Chicago brothers.

News of the passage of our new dental law has just reached us. The dentists of Missouri have all pulled together and the result is a new law which places us in line with other progressive states.

Yours truly, ST. LOUIS.

A MOMENTOUS QUESTION.—A dentist in London has written the *Lancet* to ask if it would be proper for him to extract a tooth from a patient who had been anesthetized by an homeopath. The question has staggered even such expert medical casuists as the editors of the *Lancet*, and they suggest that it be referred to the British Dental Association.—*Medical Record.*

NEURALGIA.—Dr. L. Leonard Corning, of New York, recently explained in the *New York Medical Record* his new method of treatment for neuralgia. He has a combination needle and lancet fixed on a hypodermic syringe. The latter is slightly heated and filled with a mixture of paraffin and oil of theobroma, mixed in proper proportions to have a melting point of 105 deg. F., or high enough to chill and harden several degrees above the normal heat of the body. The needle is inserted, a slight injection made, and with the knife edge the affected nerve is severed; and during the withdrawal of the knife oil is forced in. Ice is immediately applied for the purpose of chilling the oil and forming a plug which will permanently prevent the junction of the severed nerve filaments. Hemorrhage ceases immediately the plug hardens. Success in several cases is reported.

bending broach where it binds; and never use a Gates-Glidden drill and you will not be troubled with broken drills and broaches in canal. The percentage of fractured walls in these cases is too small to warrant cutting off and crowning them all.

Dr. Kennedy: Under the circumstances save the natural organs, first by filling, then crown if necessary. In case described, first put on the rubber-dam, disinfect, remove decay and fill the pulp-chamber with gutta-percha, then fill the distal cavity with amalgam. Keep the patient in the office an hour or two until the amalgam is hard, then open the tooth anterior to the filling, remove the gutta-percha from pulp-chamber, clean and fill canals. He does not understand how anyone can use a Donaldson cleanser in preparing the anterior canals, especially the broaches having a long handle. He is indebted to Dr. W. N. Morrison for the ease with which he meets these cases, since he learned from Dr. Morrison to use the Swiss jewelers' broaches. He cuts off shank of the broach and uses pliers to place in position in tooth, then rotates it between thumb and forefinger, using preferably a smooth broach with shred of cotton. If the broach should break, the cotton stays with portion left in canal, and by means of it this piece may be removed. If the broach is barbed, the barbs should be counted in order that you may know positively if any portion breaks off in the canal.

Dr. Marshall in closing the discussion explained that he did not select the first molar because he thought it more difficult than the second or third inferior molar, but because he wanted to present a typical case, and what was true of the first was also true of the second and third in an even greater degree. In reply to Dr. Conrad's remark that these roots are not reached because of lack of skill of the operator, he thinks the greatest difficulty not the treating and filling but the prognosis. The operator does not live who always reaches those anterior canals. He then related Dr. J. C. Storey's experience with capping pulps—down in Texas—and told how that worthy dentist never knew how many of those pulps died, because when they died the patient always went to the other fellow. And so with these cases, we do not know how many fail and go to the other fellow.

He does not accept the statement that a filling should be used at first, expecting to crown the tooth ultimately. As to occlusion, while we cannot always secure as perfect an occlusion with a crown

The Dental Digest.

PUBLISHED THE

TWENTY-EIGHTH DAY OF EVERY MONTH.

Editorial.

CRITICISMS BY DRS. BLACK AND JOHNSON.

We publish on pages 133 and 193 criticisms of our editorial in last month's issue on Dr. Black's paper, "Recent Improvements in Filling Teeth." We wrote the editorial with a view of getting a thorough discussion of the subject, and will reply to the criticisms in our next issue. In the meantime we invite discussion of the subject. The proper care of the proximal surfaces of the teeth is about the most important question in dentistry, and therefore cannot be too carefully studied or discussed. Our pages are open to a free interchange of thought on proper contouring of interproximal spaces.

ARE WE GROWING?

Any one taking a pessimistic view of the dental profession, claiming that it is not improving, should have been at the last meeting of the Chicago Dental Society and listened to Dr. I. A. Freeman's paper on "Removal of Deposits Upon Teeth," which is published in this issue, with the discussion which followed, and then have looked up papers and discussions on the same subject fifteen years ago. No one could fail to be encouraged at the advancement shown.

The paper brought prominently forward the important fact of the treatment of pyorrhea, and the interest in the subject, as shown by the discussion, was checked only by the lateness of the hour. Every one knows that the important part of the treatment of pyorrhea is removal of the sanguinary deposit and keeping the teeth free from it. The interest shown proves that the treatment of this disease is receiving more and more consideration, and we are sure that constant and repeated discussion of the subject is bound to result in good and to aid in a better treatment of this ever-constant disease.

QUESTIONS SUBMITTED FOR DISCUSSION.

We call attention to the list of questions selected by the committee appointed by the American Dental Association. There has never been a close relationship or cooperation of the local and state societies and the association, although the latter is made up of delegates from these societies. To increase this bond of union and get

active cooperation is the object of this committee. Therefore the committee have tried to select subjects which are not settled and on which much difference of opinion exists, hoping that they may be discussed by members of the various societies in the United States, so that the results of these discussions can be taken up by the proper sections of the parent society and made the basis of their reports. If the aid of the members of the different societies can be secured much good will result, and we urge an active interest from the members and hope the officers will assist in this movement.

The meeting of the American Dental Association will be held at Old Point Comfort, commencing the second Tuesday in August. Now is the time to select a subject for the paper you expect to write for your local or state meeting. Look over the list here published. You will find several subjects which should be discussed.

UNION OF AMERICAN AND SOUTHERN ASSOCIATIONS.

We publish on page 138 of this issue a paper by Dr. Fillebrown to which we would call special attention and ask that those interested give the subject careful thought, as the matter of this union will be presented at our next meeting for discussion and action. We feel safe in asserting that on the main question there is but one side. At least it seems to us that we should have one national association where everything of importance is presented for consideration each year, and where the members of the profession can meet together from all parts of the country in one meeting.

The details of reorganization we do not care to discuss here, since much of this must be taken from what experience has already proven to be essential and correct. The rules which are to be our guide can be amended from time to time if circumstances so indicate. We believe the consolidation of the two associations is desirable and will be brought about. If each one is desirous of doing what seems best for all the work will be easy. The one who has plans of his own to present which have never been tried should have them very distinct in his mind before presenting them, otherwise they can act only as a hindrance.

We are especially anxious to have an organization which is truly representative and which will be more than a mass meeting. To accomplish this means earnest work and will be a great step in the right direction, and we urge all to give the matter careful thought.

Notices.

IOWA STATE DENTAL SOCIETY.

The annual meeting of the Iowa State Dental Society will be held in Des Moines, Iowa, May 4-7, 1897. The profession in this and other states are cordially invited to attend. W. G. CLARK, Secretary, Cedar Rapids.

ILLINOIS STATE DENTAL SOCIETY.

The 33rd annual meeting of this society will be held at Peoria, May 11-14, 1897. An excellent program is in course of preparation. Members are urgently requested to be present, and the profession generally are cordially invited. A reduced rate of one and one-third fare has been granted from all points within the state.

LOUIS OTTOFY, Secretary, Masonic Temple, Chicago.

LIST OF LATEST DENTAL PATENTS.

577,507. Alfred Cane, Golden Gate, Cal. Dental Plugger.
577,638. John T. Barker, Wallingford, Conn. Furnace for Dental Use.
26,678. James W. Ivory, Philadelphia, Pa. Design for Dental Tool for Carrying Amalgam.
577,887. Jere E. Stanton, Boston, Mass. Dental Mallet.
578,729. J. Austin Dunn, Chicago, Ill. Dental Clamp.
579,094. Mont C. Merker, Philadelphia, Pa. Dental Chair.

EASTERN ILLINOIS DENTAL SOCIETY.

At the 11th annual meeting of the society, held at Mattoon, Ill., March 16 and 17, 1897, the following officers were elected for the ensuing year: President, Dr. A. S. Watts, Decatur; Vice-President, Dr. F. M. Conkey, Homer; Treasurer, Dr. S. A Campbell, Mattoon; Secretary, Dr. W. A. Hoover, Gibson City; Librarian, Dr. T. S. Childs, Decatur; Ex-Com., Dr. I. B. Johnson, Onarga; Dr. C. H. Tillotson, Mattoon; Dr. J. W. Reed, Paxton; Supervisor of Clinics, Dr. W. C. Lumpkin, Mattoon.

QUESTIONS SUBMITTED FOR DISCUSSION BY LOCAL SOCIETIES. FORMULATED BY THE COMMITTEE APPOINTED BY THE AMERICAN DENTAL ASSOCIATION.

1. Pyorrhea alveolaris; what is it and how many varieties are there? Are all local in origin or constitutional, or both? What is the treatment, local or constitutional, or both? What may be regarded as a cure? Is the disease likely to recur?

2. *a*—What is the cause of dental caries? *b*—Why is caries so much more active in some mouths that in others? *c*—What changes take place where caries ceases its activity in mouths heretofore predisposed? *d*—Are there recognizable signs by which we may know whether or not caries will cease with advancing age?

3. To what extent are we justified in giving our patients systemic treatment?

4. To what extent and when are we justified in using cataphoresis? Is there danger of injuring the dental pulp or other tissues by its use?

5. What can we do to increase the attendance at our dental societies?

6. In view of the recent investigations has amalgam been a blessing or a curse to humanity?

7. Are there any proofs that the mercury in amalgam fillings is injurious to the health of the patient?

8. What are the best materials for filling teeth and the prospective durability of fillings in different cases?

9. What are the best methods of bleaching teeth?

L. P. Bethel,
A. W. Harlan, } Committee.
J. N. Crouse,

HARVARD ODONTOLOGICAL SOCIETY.

At the 19th annual meeting of this society, held at Young's Hotel, Boston, February 27, 1897, the following officers were elected for the ensuing year: President, Waldo E. Boardman, D.M.D.; Rec. Secy., Joseph T. Paul, D.M.D.; Cor. Secy., Edward B. Hitchcock, M.D., D.M.D.; Treasurer, Lyman F. Bigelow, D.M.D.; Editor, Henry L. Upham, D.M.D.; Executive Committee, Joseph T. Paul, D.M.D., Chairman, Frank T. Taylor, D.M.D., and William P. Cooke, D.M.D.

E. B. Hitchcock, Secy., Newton.

News Summary.

Most People Do.—It is folly to expect the stomach to do the work of the teeth.—*Ex.*

Aromatic Sulphuric Acid.—If this be spilled upon black walnut furniture and the color be changed, it can be restored by applying chloroform to the spoiled surface.—*F. J. Fesler.*

Blood Stains.—Dr. Blenkiser in the *Scalpel* says that surgical instruments, sponges, the hands of the operator and blood-stained articles may be readily cleansed by washing them in a tepid solution of tartaric acid and rinsing in water without soap.

Mad Dog Bite.—A professor in the University of Klausenburg claims to have compounded a solution which completely neutralizes the poison introduced into the system by the bite of a mad dog. It consists of chlorin water, salt-brine, sulphuric acid, permanganate of potassium and eucalyptus oil.—*Dr. Fowling, Albia, Iowa.*

Nitrous-Oxid Gas with Oxygen in removal of adenoids has the advantages that: 1. It is not attended with danger to life. 2. No preparations are required. 3. Hemorrhage is not affected by it. 4. Jactitation and cyanosis produced by pure nitrous oxid are absent. 5. Any position may be safely

assumed. 6. Anesthesia is longer than by the nitrous oxid alone. 7. Unpleasant after-effects are very rare.—*Gardner.*

EDITOR'S DELIGHT.—A new game called "The Editor's Delight" is played in this way: Take a sheet of ordinary writing paper, fold it carefully, and inclose a bank-note sufficiently large to pay up all arrearages and one year in advance. Keep an eye on the editor, and if a smile adorns his face the trick works like a charm. Now is the time to play the joke.—*Herald Christian Advocate.*

ERRATUM.—In the article by Dr. Weld, on "Disinfectants and the Chemico-Metallic Method of Treating and Filling the Difficult Root-Canals of Semi-Devitalized Teeth," in the February issue of the DIGEST, two decimal points are omitted in the table referring to euthymol as an antiseptic. On page 110, last series, first column, it reads 75 per cent, should read .75 per cent; next column, 5 per cent, should read 1.5 per cent.

DEATH DURING A DENTAL OPERATION.—Death during the performance of a dental operation, although not unknown, is nevertheless extremely rare. Such an event has recently occurred at Swaffham, and is recorded in the *Eastern Daily Press* (January 2). The patient was 18 and had been ailing for some time. He went to a dentist named Wallace to have a tooth stopped, and shortly after the operation was commenced he was seized with a violent fit of coughing, which led to fatal syncope. A medical man was called in and everything possible done to save the patient's life, but to no avail.—*Jour. Brit. Dent. Assn.*

TO DISTINGUISH COCAIN FROM EUCAIN, AND TO DETECT A MIXTURE OF THE TWO.—The excessive solubility of hydrochlorate of cocain permits its being distinguished from hydrochlorate of eucain, for eucain is soluble one part in nine of water, while cocain is soluble in less than its own weight of water. To detect eucain that may be fraudulently added to cocain, because of its costing less, Vulpius states that by dissolving 0 gr.·10 of the suspected salt in 50 cc. of water and then adding two drops of aqua ammonia, if the cocain is free from eucain the liquid will remain clear, even though a few crystals may be deposited, whilst if eucain is present the solution becomes cloudy or milky in appearance.—*L'Odontoligique.*

Obituary.

DR. F. H. DETERDING.

Dr. F. H. Deterding, one of the best known dentists in Allegheny, died at his late home, corner Ohio and James streets, at 10 o'clock, December 9, 1896. He was taken ill about six weeks previous with pneumonia, which gradually developed into complications which caused death. Deceased was an alumnus (1881) of the Ohio Dental College, and had been practicing in Allegheny ever since his graduation. He was a prominent member of the Royal Arcanum, A. O. U. W., Jr. O. U. A. M., Past Regents' Association of Pennsylvania, and of several other dental and secret organizations. A wife, one son and a daughter survive him.

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LISTERINE is invaluable for the care and preservation of the teeth. It promptly destroys all odors emanating from diseased gums and teeth, and imparts to the mucous surfaces a sense of cleanliness and purification; used after eating acid fruit, etc., it restores the alkaline condition of the mouth necessary for the welfare of the teeth, and employed systematically it will retard decay and tend to keep the teeth and gums in a healthy state. LISTERINE is valuable for the purification of artificial dentures and for the treatment of all soreness of the oral cavity resulting from their use. Patients wearing bridge work should constantly employ a LISTERINE wash of agreeable strength.

LISTERINE is used in various degrees of dilution; one to two ounces of LISTERINE to a pint of water will be found sufficiently powerful for the general care of the deciduous teeth of children, whilst a solution composed of one part LISTERINE and three parts water will be found of agreeable and thoroughly efficient strength for employment upon the brush and as a daily wash for free use in the oral cavity, in the care and preservation of the permanent teeth.

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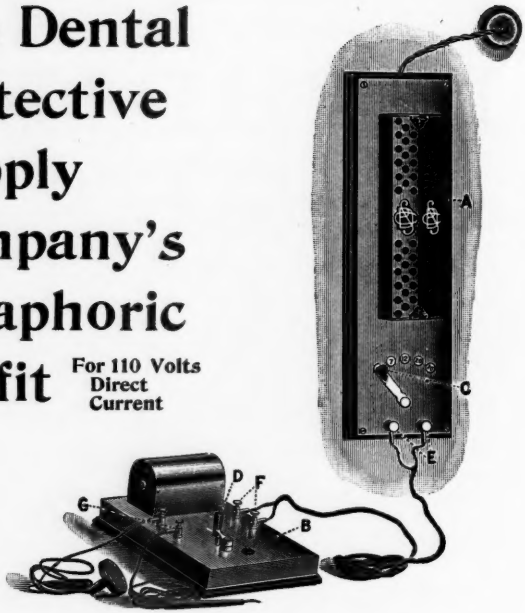

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By the use of our Cataphoric Outfit, illustrated above, the most sensitive dentine or live pulp can be painlessly removed, or bleaching performed.

The resistance board (A) should be hung on the wall, in a convenient position for operating—the controller (B) being placed either on your bracket, or if preferred in the patient's lap, and can be operated by either party.

By pushing the lever forward on the resistance board to point of first contact, 7 volts are conducted to the controller—by turning handle (D) you increase the voltage from nothing to a maximum of 7 volts by gradations of 1–10 volts.

Should stronger current be required, the handle on controller must FIRST be brought back to zero; the lever (C) can then be pushed forward to point of second contact when 12 volts will be conducted to controller, and so on to 30 volts. The simple movement of handle (D) will then be all that is necessary.
Size of Resistance Board 17 in. by 5¼ in. Size of Controller Board 9½ in. by 6½ in.

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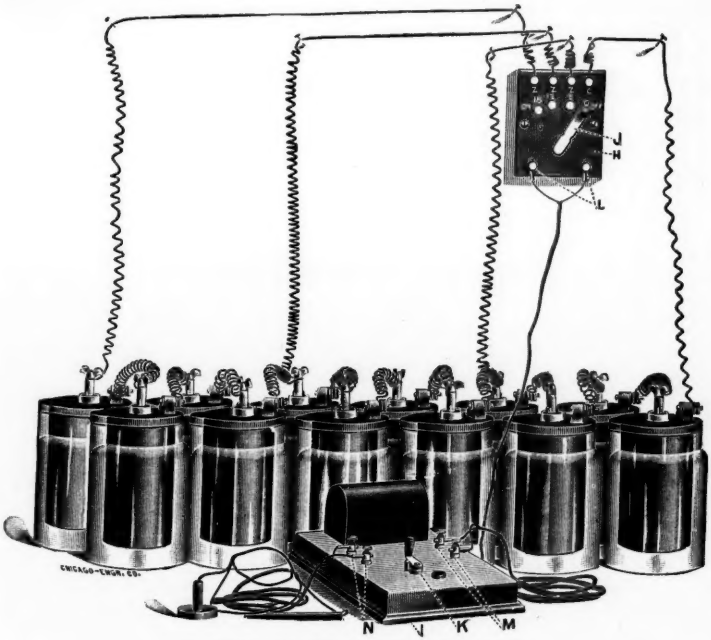

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CATAPHORIC OUTFIT WITH BATTERY. PRICE $26.00

COMPLETE WITH 18 CELLS

As there has been a considerable number of inquiries for our Cataphoric Outfit attached to battery we are pleased to announce that we can now supply the same as illustrated above; space prevents us from showing more than twelve cells in illustration, but the outfit is supplied with *18 cells*, affording a total of about 25 volts.

It will be noticed that 6, 12 or 18 cells can be brought into operation as desired, a most *important improvement* over other battery outfits on the market, and one which the dentist will quickly appreciate who has to operate on an inflamed pulp where a *low* voltage is *absolutely essential.*

The cells should be placed in some convenient closet and wires carried to the switch board (H), which, with the controller board (I), should be placed within convenient reach of the operator.

The method of operation is exactly similar to that performed with the direct current outfit.

Size of Switch Board 4 in. by 4¾ in. Size of Controller Board 9½ in. by 6½ in. Size of Battery Cell: Diameter 4½ in., Height 7¼ in.

Full directions sent with each Outfit.

Terms Cash With Order—30 Days Trial Allowed. If not satisfactory money refunded provided Outfit is returned in good condition.

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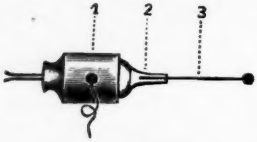
Electrodes for Cataphoresis

Long Rubber Handle Electrode, with chuck to hold platinum point,

Price (as illustrated) $1.50



Positive Electrode, for use with Rubber Dam Clamp. It is attached to the clamp by means of spring clips at back end. 1—Body of electrode. 2—Chuck to hold platinum point; this portion is entirely insulated from No. 1. 3—Platinum Point.

Price $2.00

Extracting Electrode. This is used by inserting platinum point of ordinary positive electrode into hole at end of handle, from which point the current is conducted to inside of rubber cups.

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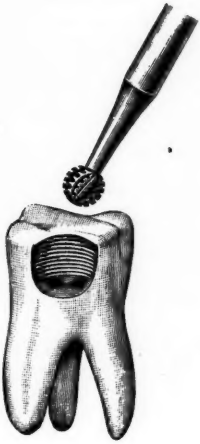

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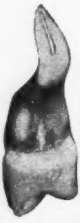
Photographed from the original tooth. Harjes & Wright, New York.

View of superior molar disinfected and filled by the **Chemico-Metallic Method**. Roots filed away, showing metal, oxid, albuminate, etc. Time of operation, eleven minutes; putrescent pulp in the buccal root-canals not extracted.
Photographed from the original tooth. Falk, Madison Square, New York,

Superior bicuspid, two canals and two foramens. Disinfected and filled in four minutes. Photo. from the original tooth. Harjes & Wright, New York.



Superior bicuspid, one canal, bayonet-shaped root, showing adaptation of metallic bristle. Disinfected and filled in two minutes. Photo. from the original tooth, Harjes & Wright, New York.

Superior bicuspid; one foramen, with two canals converging. Disinfected and filled in three minutes. Photo. from the original tooth, Harjes & Wright, New York.

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says Dr. F. H. Funston in *Popular Science News*, "dentifrices have multiplied by thousands, each presenting its own peculiar claim. Some are really valuable; others are harmless; not a few are dangerous. Tooth powders, too, which sometimes accompany fluid dentifrices, must also be looked upon with suspicion, as they not infrequently contain ingredients that may prove detrimental

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